VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a minor, municipal permit. The effluent limitations contained in this permit will maintain the Water Quality Standards 9 VAC 25-260-10 et.seq. The discharge is a result of the operation of a municipal wastewater treatment plant treating sewage originating from a residential population, marina, and restaurant. This permit action includes revised effluent limitations and special conditions in the permit.

1. Facility Name and Location/Mailing Address: Windmill Point Resort & Yacht Harbor Wastewater Treatment Plant (WWTP)
56 Windjammer Lane
Whitestone, VA 22578

Facility Owner: RL Prop 2011-1 Investments, LLC
Owner Contact: Peter D. Anzo
Title: Manager for RL Prop 2011-1 Investments, LLC
Mailing Address: c/o Vinings Marine Group, LLC
2839 Paces Ferry Road, Suite 450
Atlanta, GA 30339
Telephone: (770) 984-9500

Facility Operator: Cody Long
Long and Associates, Inc.
(804) 769-7668
longandassoc@aol.com

2. SIC Code: 4952, 4493

3. Permit No. VA0060569 Permit Expiration Date: May 2, 2011

4. Application Complete Date: Date: November 21, 2011
Permit Drafted By: Jeremy Kazio Date: March 2, 2012

DEQ Regional Office: Piedmont Regional Office

Reviewed By: Brad Ricks Date: March 8, 2012
Curt Linderman Date: April 12, 2012; April 23, 2012; May 3, 2012

5. Receiving Stream:
Name: Windmill Point Boat Basin, tributary of Rappahannock River
River Mile: 3-XEV000.04
Basin: Rappahannock River
Subbasin: N/A
Section: 1
Class: II
Special Standards: a – Shellfish waters

Tidal? YES – Statistical low flows not applicable to tidal receiving waters

Tidal dilution ratios used:

Acute Toxicity:	2:1	(mixing zone = 1 part receiving water, 1 part effluent)
Chronic Toxicity:	10:1	(mixing zone = 9 parts receiving water, 1 part effluent)
Human Health:	10:1	(mixing zone = 9 parts receiving water, 1 part effluent)

On 303(d) list? YES

Please see **Attachment C** for the Flow Frequency Memo by DEQ Water Planning Staff

6. Operator License Requirements: Class IV for 0.030 MGD plant
Class III for 0.040 and 0.080 MGD plant
The recommended attendance hours by a licensed operator and the minimum daily hours that the treatment works should be manned by operating staff are contained in the Sewage Collections and Treatment Regulations (SCAT) 9 VAC 25-790-300.

7. Reliability Class: Class I
Reliability is a measurement of the ability of a component or system to perform its designated function without failure or interruption of service. The reliability classification is based on the water quality and public health consequences of a component or system failure. The permittee is required to maintain Class I Reliability for this facility.

8. Permit Characterization:

( ) Issuance
(X) Reissuance
( ) Revoke & Reissue
( ) Owner Modification
( ) Board Modification
(X) Change of Ownership/Name
Effective Date:
(X) Municipal
SIC Code(s): 4952, 4493
( ) Industrial
SIC Code(s):
( ) POTW
(X) PVOTW
(X) Private
( ) Federal
( ) State

(X) Existing Discharge
( ) Proposed Discharge
(X) Effluent Limited
(X) Water Quality Limited
( ) WET Limit
( ) Interim Limits in Permit
( ) Interim Limits in Other Document (attached)
( ) Compliance Schedule Required
( ) Site Specific WQ Criteria
( ) Variance to WQ Standards
( ) Water Effects Ratio
(X) Discharge to 303(d) Listed Segment
( ) Toxics Management Program Required
( ) Toxics Reduction Evaluation
( ) Possible Interstate Effect
( ) Storm Water Management Plan

9. Wastewater Flow and Treatment:

Table 1: Wastewater Flow and Treatment

Outfall Number	Wastewater Source		Treatment	Design Flow
001	Existing Facility	Residential condominiums, bathhouse, boat pumpout station, boat slip sewer hookups (transient and seasonal), restaurant.	2-Cell Aerated lagoon, chlorination, dechlorination	30,000 gpd (0.030 MGD)
	Proposed Facility **	Phase I – Additional residential units, boat slips, and expanded restaurant.	Equalization, membrane bioreactor, sludge holding and return, ultraviolet disinfection	40,000 gpd (0.040 MGD)
		Phase II – Additional residential units	Addition of second membrane bioreactor to 40,000 gpd treatment works	80,000 gpd (0.080 MGD)

** - The wastewater sources and treatment methods included in this fact sheet for the expanded design flows are based on preliminary documentation provided with the permittee's 2006 permit application. Ownership of the facility has changed several times since, and consequently the expanded facility may not reflect the proposal included in this fact sheet. Therefore, prior to issuing a Certificate to Construct (CTC) for the expanded facility, the 2012 permit may be reopened and revised to include appropriate limitations and monitoring requirements for the treatment proposed in the CTC application for the expanded facility.

Please see **Attachments A1 and A2** for topographic map and aerial photo. See **Attachment A3** for existing facility flow diagram**.** See **Attachments A4 through A6** for proposed Phase I and Phase II description and proposed treatment works flow diagram**.**

10 Sludge Disposal: Sludge is held within the aeration lagoons. Historically, it has not been necessary for the permittee to remove sludge from the lagoons. If it becomes necessary in the future, the permittee will hire a licensed septage hauler to transport the sludge to a nearby wastewater treatment facility. Documentation of sludge use and disposal activities will be submitted and approved in accordance with Part I.C.3 and I.C.6 of the 2012 permit prior to sludge removal or issuance of a CTO to operate the new/expanded facility.

11. Discharge Location Description: This facility discharges to the Windmill Point boat basin on Fleets Island in Lancaster County. The boat basin is a shallow constructed inlet of the Rappahannock River and contains boat slips to serve the facility's marina.

Name of USGS topo map: Deltaville– 122D (See **Attachment A1**)

12. Material Storage: Chemicals used for the wastewater treatment plant are stored in proper containers and under roof cover.

13. Ambient Water Quality Information:
Ambient water quality information was derived from data obtained from monitoring station 3-RPP010.60. Monitoring station 3-RPP010.60 is located on the Rappahannock River at Orchard Point, which is approximately 10.4 miles upstream of the facility (See **Attachment B**). The receiving stream is listed as a shellfish water.

14. Antidegradation Review and Comments: Tier 1 __X___ Tier 2 _____ Tier 3 _____
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect those uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The antidegradation review begins with a Tier determination. The receiving stream is considered a Tier 1 water due to the limited mixing within the boat basin (See **Attachment C** for Flow Frequency Analysis by J.Palmore dated April 19, 2011).

15. Site Inspection: By Heather Horne/Meredith Williams on October 13, 2011. (See **Attachment D**)

16. Effluent Limitation Development:

Table 2 –Basis for 2012 Permit Limitations

PARAMETER	APPLICABLE DESIGN FLOW	BASIS FOR EFFLUENT LIMITS	DISCHARGE LIMITATIONS						MONITORING REQUIREMENTS	
			MONTHLY AVERAGE		WEEKLY AVERAGE		MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow (MGD)	0.030 MGD	NA	NL		NA		NA	NL	1/Day	Estimate
	0.040 MGD								1/Day	Estimate
	0.080 MGD								Continuous	Totalizing, Indicating, & Reporting
pH	0.030 MGD	1,4	NA		NA		6.0 SU	9.0 SU	1/Day	Grab
	0.040 MGD									
	0.080 MGD									
BOD_5	0.030 MGD	2,4	30 mg/L	3400 g/d	45 mg/L	5100 g/d	NA	NA	1/Month	Grab
	0.040 MGD			4500 g/d		6800 g/d			1/Month	Grab
	0.080 MGD			9100 g/d		14000 g/d			1/Week	4-Hour Composite
Total Suspended Solids (TSS)	0.030 MGD	2,4	30 mg/L	3400 g/d	45 mg/L	5100 g/d	NA	NA	1/Month	Grab
	0.040 MGD			4500 g/d		6800 g/d			1/Month	Grab
	0.080 MGD			9100 g/d		14000 g/d			1/Week	4-Hour Composite
Total Residual Chlorine (TRC)	0.030 MGD	1	13 µg/L		16 µg/L		NA	NA	1/Day	Grab
	0.040 MGD		13 µg/L		16 µg/L				1/Day	
	0.080 MGD		12 µg/L		14 µg/L				3/Day at 4-Hour Intervals	
Ammonia as N	0.030 MGD	1	2.32 mg/L		2.32 mg/L		NA	NA	1/Month	Grab
	0.040 MGD		8.98 mg/L		8.98 mg/L				1/Month	Grab
	0.080 MGD		6.14 mg/L		8.98 mg/L				1/Week	4-Hour Composite
Dissolved Oxygen (DO)	0.030 MGD	2	NA		NA		5.0 mg/L	NA	1/Day	Grab
	0.040 MGD									
	0.080 MGD									
Fecal Coliform	0.030 MGD	1	200 N / 100 mL (Geometric Mean)		NA		NA	NL	4/Month (between 10am and	Grab
	0.040 MGD									
	0.080 MGD									
Enterococci	0.030 MGD	1	35 N / 100 mL (Geometric Mean)		NA		NA	NL	4/Month (between 10am and	Grab
	0.040 MGD									
	0.080 MGD									
Total Phosphorus Annual Average	0.030 MGD	3	---		---		---	---	---	---
	0.040 MGD		1.9 mg/L		NA		NA	NA	1/Year	Calculated
	0.080 MGD		0.9 mg/L		NA		NA	NA	1/Year	Calculated
Total Nitrogen-Annual Average	0.030 MGD	3	---		---		---	---	---	---
	0.040 MGD		14 mg/L		NA		NA	NA	1/Year	Calculated
	0.080 MGD		7.0 mg/L		NA		NA	NA	1/Year	Calculated
Total Phosphorus – Year-to-Date (mg/L)	0.030 MGD	3	---		---		---	---	---	---
	0.040 MGD		NL		NA		NA	NA	1/Month	Calculated
	0.080 MGD		NL		NA		NA	NA	1/Month	Calculated
Total Nitrogen– Year-to-Date (mg/L)	0.030 MGD	3	---		---		---	---	---	---
	0.040 MGD		NL		NA		NA	NA	1/Month	Calculated
	0.080 MGD		NL		NA		NA	NA	1/Month	Calculated

1. Water Quality Standards (9 VAC 25-260)
2. Best Engineering Judgment (BEJ)
3. Nutrient Regulations and Related DEQ Guidance (§ 62.1-44.19:13 - § 62.1-44.19:18, 9 VAC 25-820, 9 VAC 25-40, GM07-2008 Amd.2)
4. Federal Effluent Guidelines (40 CFR 133.102)

pH: A pH limitation of 6.0 to 9.0 standard units is assigned to all discharges into Class II Estuarine Waters in accordance with the Water Quality Standards (WQS), 9 VAC 25-260-50, and federal secondary treatment standard guidelines.

BOD_5 and TSS: The BOD_5 limitation of 30 mg/L, and the TSS limitation of 30 mg/L, were originally applied as a result of a Limitation Rationale Memorandum by J.D. Taft to D. Phillips dated December 5, 1980, which was initiated due to the permittee requesting to expand his design flow capacity from 0.020 MGD to 0.030 MGD. The memorandum advised that the facility's receiving stream was unmodelable at that time, citing that the shape of the boat basin and the narrow inlet/outlet to the Rappahannock River mainstem provided very little tidal flushing within the basin. The memorandum suggested basing the BOD_5 and TSS limits on Best Professional Judgment, which, without an applicable water modeling basis for limitations, the permit writer consulted with the Federal Effluent Guidelines to aid in formulating the limitations of 30 mg/L for BOD_5 and 30 mg/L for TSS. Concurrence on this rationale was provided by M.D. Phillips via memorandum dated December 8, 1980. It should be noted that the author of the memorandum recommended relocating the outfall in order to take advantage of the enhanced tidal flushing characteristics of the Rappahannock River mainstem, however, he also noted that the State Health Department expressed concern that relocating the outfall might cause further shellfish harvest closures.

A second stream sanitation evaluation was memorialized in a Receiving Stream Analysis Memorandum by Jon Van Soestenbergen, dated October 12, 2000, in which the author concluded that the receiving stream was able to be modeled using the most current methods and technology available at the time. However, it was the author's judgment that the model would likely produce unreliable or technically indefensible results, and that extensive field studies would be necessary to effectively calibrate and verify the results if the model were used as the basis for permit limitations. Consequently, the author suggested that the BOD_5 and TSS limitations remain the same, but that the effluent dilution ratios applied to toxicity evaluations be adjusted to 50:1 for chronic toxicity and 2:1 for acute toxicity.

In his March 18, 2005 permit application transmittal letter, the permittee requested that expansion design flow tiers be incorporated into the 2006 permit reissuance in order to account for plans for future facility growth. This proposal necessitated a reevaluation of the facility's discharge. The results of this evaluation are contained in the most recent Stream Sanitation Analysis memorandum by Jennifer V. Palmore dated December 1, 2005, which concluded that the existing BOD_5 and TSS limitations were appropriate for the existing effluent flow regime as well as the proposed expansions. Additionally, the author recommended the insertion of a dissolved oxygen limitation of 5.0 mg/L (minimum), as well as the reduction of the dilution ratio for chronic toxicity evaluations from 50:1 to 10:1. Since there haven't been any changes to the facility's discharge location or existing or proposed flows since the most recent stream sanitation analysis, the BOD_5 and TSS limitations have been carried forward from the 2006 permit to the 2012 permit reissuance. See **Attachment E** for each of the above referenced documents.

Ammonia as N and TRC: If it is feasible that a specific pollutant for which in-stream criteria are given in the *Virginia Water Quality Standards* (9 VAC 25-260 et.seq.) may exist in the facility's effluent, a Reasonable Potential Analysis must be conducted in order to determine if it is statistically probable that the permittee's future discharge may contain that pollutant in concentrations which are harmful to aquatic life and/or human health within the receiving stream. The first step of the analysis is to calculate the pollutant's acute and chronic wasteload allocations (WLAs), which are defined as the pollutant concentration that may be discharged by the facility over specific periods of time which will maintain the in-stream criteria referenced above. The WLAs are determined using a DEQ-sourced Excel spreadsheet called MSTRANTI, which requires inputs representing site specific data for critical flows, dilution, mixing, and water quality for both the receiving stream and the effluent. After the WLAs are calculated, a desktop computer application called STATS is utilized to determine if future pollutant concentrations may exceed the WLAs. The STATS application fits the WLAs, as well as observed effluent data, to respective lognormal distributions. If the projected effluent distribution exceeds either of the projected WLA distributions, then a limitation is deemed necessary. The limitation is equal to the concentration expected to be observed at the proposed limitation monitoring frequency within the most protective projected WLA distribution.

The inputs required by MSTRANTI for critical ambient water quality for this facility were calculated using data from monitoring station 3-RPP010.60, as indicated in Item 13 of this fact sheet. The effluent inputs were derived from DMRs and application data submitted by the permittee (see

Attachment F for DMR and Form 2A data). Please see the chart below for specific inputs. Note that the maximum temperature reported by the permittee on Form 2A was considered a conservative but reasonable approximation of the facility's 90th percentile effluent temperature.

Table 3: MSTRANTI Source Data			Temp. (°C)	pH (SU)	Salinity (g/kg)	Hardness (mg/L as $CaCO_3$)
Ambient Inputs (Attachment B)	3-RPP010.60: (July 1984 – March 2011)	90th Percentile	27.0	8.2		N/A for Saltwater Discharges
		10th Percentile	5.4	7.4		
		Average			16.15	
Effluent Inputs (Attachment F)	Application Form 2A (2012 Permit)	90th Percentile	29.1			
	DMR's: (July 2005-March 2011	90th Percentile		7.5		
		10th Percentile		7.0		
Tidal Dilution Ratios (Attachment C)	Recommended in the most recent Stream Sanitation Analysis by Jennifer V. Palmore, dated December 1, 2005 (**Attachment E**), and reaffirmed in the Flow Frequency Memorandum by Jennifer V. Palmore dated April 19, 2011 (**Attachment C**)					

For Total Residual Chlorine and Ammonia, GM 00-2011 requires that values of 20 mg/L and 9.0 mg/L, respectively, be entered into STATS as effluent data in order to bypass the program's Reasonable Potential Analysis because these pollutants are either purposely introduced or known to exist in this facility's effluent. The limitation evaluation indicated that less stringent limits for Ammonia are required for each design flow tier, mainly due to lower pH values reported in the effluent since the 2006 permit reissuance. Because the permittee is in compliance with his 2006 Ammonia limitation, antibacksliding policies prevent relaxation of the limit. However, the 2006 Ammonia limits for the two expansion tiers have not become effective and therefore are not subject to antibacksliding policies. The TRC limitations resulting from the STATS analysis remain equal to the 2006 permit with the exception of that calculated for the 0.080 MGD flow tier, which is more stringent for the 2012 permit due to the increased monitoring frequency for this parameter (please see **Attachment G** for the 2012 and 2006 MSTRANTI and STATS printouts). Please note that the wasteload allocations entered into STATS for the TRC limitation evaluation are for Chlorine Produced Oxidants (CPO). Chlorinated effluents discharged to salt water react to produce chlorine produced oxidants that have a toxic impact similar to TRC in freshwater. It is assumed that CPO in salt water receiving streams is controlled by the effluent TRC limit and are therefore interchangeable.

DO: The DO limitation of a minimum 5.0 mg/L is based on Best Engineering Judgment as recommended in the Stream Sanitation Analysis Memorandum by Jennifer V. Palmore dated December 1, 2005 (see **Attachment C**).

Fecal Coliform: For sewage discharges that may reach shellfish waters, permits limit fecal coliform with an effluent limit of 200 colony forming units per 100 milliliters, applied as a monthly geometric mean. Although the Water Quality Standards have been amended to remove the reference to this effluent limit in shellfish waters, the Virginia Department of Health, Bureau of Shellfish Sanitation still uses fecal coliform as an indicator for determining the quality of shellfish waters, and it is necessary to ensure discharges meet this level. Since it has historically maintained the in-stream water quality criteria for fecal coliform of 14/43 per 100 milliliters, the 200 per 100 milliliters effluent limit will be used in shellfish waters in order to continue meeting the in-stream criteria and for protection of shellfish under the general standard.

Enterococci: The limitation for Enterococci is expected to protect the primary contact recreation use bacteria criteria outlined in 9 VAC 25-260-170 (Water Quality Standards). The primary contact recreation bacterial in-stream criteria for protection of saltwater is 35N/100 mL colony forming units (CFU) of Enterococci bacteria is based on a monthly geometric mean resulting from at least 4 weekly

samples. The 2006 permit reissuance incorporated a limitation for Enterococci, but allowed the permittee the option of performing a Bacteria Demonstration Study. If the requirements of the Study were met, the permittee would have been allowed to eliminate the bacterial limitation in lieu of utilizing chlorine concentration to demonstrate that proper disinfection was being performed. However, the permittee did not complete the study within the required timeframe, and therefore, the Enterococci limit became effective at the end of the compliance schedule in May 2010. The limit has been carried forward to the 2012 permit reissuance.

Total Nitrogen (TN) – Calendar Year Average, Total Nitrogen – Year-to-Date, Total Phosphorus (TP) – Calendar Year Average, Total Phosphorus – Year-to-Date: Due to the permittee's request for authorization to discharge at expanded design flows of 0.040 MGD and 0.080 MGD, the permittee is registered for coverage (permit no. VAN020115) under the VPDES Watershed General Permit (WGP) in accordance with §62.1-44.19:14.C.5 of the *Code of Virginia*. Coverage under the WGP ensures that, upon design flow expansion, the permittee will be regulated in accordance with §62.1-44.19:15.A.3 (*Code of Virginia*), which requires expanding facilities with a design flow greater than or equal to 40,000 gallons per day (gpd) and less than 99,999 gpd to offset any delivered nutrient loading that exceeds the facility's permitted design capacity as of July 1, 2005.

The permittee's TN and TP permitted design capacities as of July 1, 2005 are calculated in accordance with GM07-2008 Amendment 2 (pg. 7) and assumes that secondary treatment levels are currently installed:

TN (lbs/yr) = 18.70 mg/L X 0.030 MGD X 8.3438 L/MG/mg/lb X 365 days/yr = **1,709 lbs/yr**

TP (lbs/yr) = 2.50 mg/L X 0.030 MGD X 8.3438 L/MG/mg/lb X 365 days/yr = **228 lbs/yr**

Because this facility commenced discharge prior to July 1, 2005, and both of the proposed design flow expansion tiers are less than 100,000 gpd, the permittee is not subject to the minimum nutrient removal technology requirements under §62.1-44.19:15.A (*Code of Virginia*) and 9VAC25-40-70 (*Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed*). Therefore, at a minimum, the permittee must maintain the current delivered nutrient loads reflected in the permitted design capacity, and continue to attain at least secondary treatment levels. In accordance with GM07-2007 Amnd.2 (pg. 10), nutrient concentration limitations have been inserted into the 2012 permit which represent the minimum nutrient removal requirements for this facility. The calculations for which are demonstrated below:

0.040 MGD Plant:

TN (mg/L) = (1,709 lbs/yr) / (0.040 MGD X 8.3438 L/MG/mg/lb X 365 days/yr) = **14 mg/L**

TP (mg/L) = (228 lbs/yr) / (0.040 MGD X 8.3438 L/MG/mg/lb X 365 days/yr) = **1.9 mg/L**

0.080 MGD Plant:

TN (mg/L) = (1,709 lbs/yr) / (0.080 MGD X 8.3438 L/MG/mg/lb X 365 days/yr) = **7.0 mg/L**

TP (mg/L) = (228 lbs/yr) / (0.080 MGD X 8.3438 L/MG/mg/lb X 365 days/yr) = **0.9 mg/L**

As authorized by §62.1-44.19:16.B (*Code of Virginia*), if the permittee indicates in their Certificate to Construct (CTC) for the expanded flow tier(s) that more advanced nutrient removal technology is proposed, DEQ shall reopen the individual permit and insert nutrient concentration limits which reflect the treatment levels of the proposed nutrient removal technology.

17. Basis for Sludge Use & Disposal Requirements: The referenced requirements are applicable to facilities which land apply sludge; however, this facility does not land apply sludge.

18. Antibacksliding: All limitations in the 2012 permit reissuance are the same as or more stringent than the limitations in the 2006 permit reissuance with the exception of Ammonia. A limitation evaluation was conducted as described in Item 16 of this fact sheet which resulted in the determination that a less stringent Ammonia limitation is necessary to maintain the Water Quality Criteria. Due to antibacksliding policies, the Ammonia limitation in the existing flow tier cannot be made less stringent. For the expansion flow tiers, which have never been utilized, the 2006 Ammonia limitations may be relaxed without considering it to be backsliding because, in accordance with 9VAC25-31-220.L.2.b: 1) new information is available (i.e. effluent and ambient water quality data) that was not available at the time of the 2006 permit reissuance, and 2) the permittee has not utilized the expansion flow tiers and therefore has not complied with the Ammonia limits applied therein. Therefore, the Ammonia limitations for the expansion tiers in the 2012 permit have been adjusted to the level required to maintain the Water Quality Standards.

Also, reduction or removal of the nutrient limitations from the 2006 permit as indicated in Item 21 of this fact sheet are not considered backsliding in accordance with Guidance Memo 07-2008, Amendment 2 because: a) the facility's nutrient limitations are regulated by the permittee's Watershed GP (VAN020115); b) the limitations are technology-based, so backsliding is permissible; c) the facility has not installed nutrient control treatment; and d) the facility has not undertaken any process or site management changes in order to comply with the 2006 nutrient limitations.

19. Special Conditions:

Part I.B. - Additional TRC Limitations and Monitoring Requirements
Rationale: Required by Sewage Collection and Treatment Regulations, 9VAC25-790 and Water Quality Standards 9VAC25-260-170, Bacteria; Other Recreational Waters. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.

Part I.C

a. Special Condition C.1 – Schedule of Compliance
Rationale: The VPDES Permit Regulation at 9 VAC 25-31-250 allows for schedules that will lead to compliance with the Clean Water Act, the State Water Control Law, and regulations promulgated under them. A compliance schedule has been provided for Dissolved Oxygen for the 2012 permit reissuance.

b. Special Condition C.2 – 95% Capacity Reopener
Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B 4 for all POTW and PVOTW permits.

c. Special Condition C.3 – Operations and Maintenance Manual Requirement
Rationale: Required by Code of Virginia§62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190 E.

d. Special Condition C.4 – Licensed Operator Requirement
Rationale: The VPDES Permit Regulation, 9 VAC 25-31-200 C and the Code of Virginia § 54.1-2300 et seq., Rules and Regulations for Waterworks and Wastewater Works Operators (18 VAC 160-20-10 et seq.), require licensure of operators.

e. Special Condition C.5. – Reliability Class
Rationale: Required by Sewage Collection and Treatment Regulations, 9 VAC 25-790 for all municipal facilities.

f. Special Condition C.6 – Sludge Use and Disposal
Rationale: VPDES Permit Regulation, 9 VAC 25-31-100 P; 220 B 2, and 420 through 720; and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

g. Special Condition C.7. – Sludge Reopener
Rationale: Required by VPDES Permit Regulation 9 VAC 25-31-220 C for all permits issued to treatment works treating domestic sewage.

h. Special Condition C.8 – Compliance Reporting
Rationale: Authorized by VPDES Permit Regulation, 9 VAC 25-31-190 J 4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limitation or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

i. Special Condition C.9 – Materials Handling and Storage
Rationale: 9 VAC 25-31-50 A prohibits the discharge of any wastes into State waters unless authorized by permit. Code of Virginia §62.1-44.16 and 62.1-44.17 authorizes the Board to regulate the discharge of industrial waste or other waste.

j. Special Condition C.10 - Reopener
Rationale: Section 303(d) of the Clean Water Act requires that Total Maximum Daily Loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it into compliance with any applicable TMDL approved for the receiving stream. The re-opener recognizes that, according to Section 402(o)(1) of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in this permit. Specifically, they can be relaxed it they are the result of a TMDL, basin plan, or other wasteload allocation prepared under section 303 of the Act. 9 VAC 25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9 VAC 25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

k. Special Condition C.11—Indirect Dischargers
Rationale: Required by VPDES Permit Regulation, 9 VAC 25-31-200 B.1 & B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

l. Special Condition C.12 – CTC, CTO Requirement
Rationale: Required by Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790-50. 9 VAC 25-40-70.A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade.

m. Special Condition C.13 – Nutrient Reporting Calculations
Rationale: §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9 VAC 25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, this special condition is intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits

n. Special Condition C.14 – Suspension of Annual Avg. Concentration Limits for E3/E4 Facilities
Rationale: 9 VAC 25-40-70.B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

o. Special Condition C.15 –Financial Assurance and Disclosure to Purchasers
Rationale: Required by Code of Virginia § 62.1.-44.18:3 and the Board's Financial Assurance Regulation, 9VAC25-650-10 et seq.

p. Special Condition C.16 - Treatment Works Closure Plan
Rationale: §62.1-44.19 of the State Water Control Law. This condition establishes the requirement to submit a closure plan for the wastewater treatment facility if the treatment facility is being replaced or is expected to close. Please note that this condition applies only to the 0.030 MGD facility because facility closure is addressed by, and is integral to, Financial Assurance requirements.

q. Special Condition C.17 – Water Quality Criteria Monitoring (0.040 MGD and 0.080 MGD Plants)
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit.

r. Special Condition C.18 – In-stream Construction/Activity Restriction
Rationale: This condition was inserted in response to a comment received 2/7/06 from DGIF regarding anadromous fish migration, restricting in-stream work during the time of February 15 through June 30. DGIF recommended conducting any in-stream activities during low or no-flow conditions, using non-erodible cofferdams to isolate the construction area, blocking no more than 50 percent of the stream flow at any given time, stockpiling excavated material in a manner that prevents reentry into the stream, restoring original streambed and streambank contours, revegetating barren areas with native vegetation, and implementing strict erosion and sediment control measures for instream and land efforts.

20. Part II, Conditions Applicable to All VPDES Permits
The VPDES Permit Regulation at 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

21. Changes to 2006 Permit: The tables on the next two pages represent a summary of the limitations and monitoring requirements changes to the 2006 permit for the 2012 permit reissuance.

(continued of next page . . .)

Table 4: Changes to Limitations and Monitoring (Part I.A.)

EFFLUENT CHARACTERISTICS	APPLICABLE DESIGN FLOW	DISCHARGE LIMITATIONS										MONITORING REQUIREMENTS				REASON FOR CHANGE
		MONTHLY AVERAGE				WEEKLY AVERAGE				MINIMUM		MAXIMUM		FREQUENCY		SAMPLE TYPE		
		From		To		From		To		From	To	From	To	From	To	From	To	
Flow (MGD)	0.030 MGD	NL		No Change		NA		No Change		NA	No Change	NL	No Change	1/Day	No Change	Estimate	No Change	No Changes
	0.040 MGD													1/Day	No Change	Estimate	No Change	
	0.080 MGD													Continuou	No Change	TIRE	No Change	
pH	0.030 MGD	NA		No Change		NA		No Change		6.0 SU	No Change	9.0 SU	No Change	1/Day	No Change	Grab	No Change	
	0.040 MGD																	
	0.080 MGD																	
BOD_5	0.030 MGD	30 mg/L	3.4 kg/d	No Change	3400 g/d	45 mg/L	5.1 kg/d	No Change	5100 g/d	NA	NA	NA	NA	1/Month	No Change	Grab	No Change	Load limitations revised to be expressed as whole numbers and two significant figures in accordance with GM-06-2016.
	0.040 MGD		4.5 kg/d		4500 g/d		6.8 g/d		6800 g/d					1/Month		Grab		
	0.080 MGD		9.08 kg/d		9100 g/d		13.6 kg/d		14000 g/d					1/Week		4-Hour Composite		
Total Suspended Solids (TSS)	0.030 MGD	30 mg/L	3.40 kg/d	No Change	3400 g/d	45 mg/L	5.10 kg/d	No Change	5100 g/d	NA	NA	NA	NA	1/Month	No Change	Grab	No Change	
	0.040 MGD		4.50 kg/d		4500 g/d		6.80 g/d		6800 g/d					1/Month		Grab		
	0.080 MGD		9.08 g/d		9100 g/d		13.6 kg/d		14000 g/d					1/Month		4-Hour Composite		
Total Residual Chlorine (TRC)	0.030 MGD	12.9 µg/L		13 µg/L		15.5 µg/L		16 µg/L		NA	NA	NA	NA	1/Day	No Change	Grab	No Change	Limitations revised to be expressed as two significant figures in accordance with GM-06-2016. Monitoring frequency for the 0.080 MGD plant changed to reflect current agency guidance (Permit Manual, MN-2, Page 2, rev.1/27/2010). Please see Item 16 of this fact sheet .
	0.040 MGD	12.9 µg/L		13 µg/L		15.5 µg/L		16 µg/L						1/Day	No Change			
	0.080 MGD	12.9 µg/L		12 µg/L		15.5 µg/L		14 µg/L						1/Day	3/Day at 4-Hour Intervals			
Ammonia as N	0.030 MGD	2.3 mg/L		2.32 mg/L		2.3 mg/L		2.32 mg/L		NA	NA	NA	NA	1/Month	No Change	Grab	No Change	Please see Item 16 of this fact sheet. Limitations are expressed in 3 signficant figures to match the underlying Water Quality Criteria standard in accordance with GM06-2016.
	0.040 MGD	2.3 mg/L		8.98 mg/L		2.3 mg/L		8.98 mg/L						1/Month	No Change	Grab	No Change	
	0.080 MGD	1.6 mg/L		6.14 mg/L		2.3 mg/L		8.98 mg/L						1/Week	No Change	4-Hour Composite	No Change	
Dissolved Oxygen (DO)	0.030 MGD	---		NA		---		NA		---	5.0 mg/L	---	NA	---	1/Day	---	Grab	Best Engineering Judgment - Added in accordance with the recommendation made in the Stream Sanitation Analysis by J.Palmore dated December 1, 2005
	0.040 MGD	NA		No Change		NA		No Change		5.0 mg/L	No Change	NA	No Change	1/Day	No Change	Grab	No Change	
	0.080 MGD	NA		No Change		NA		No Change		5.0 mg/L	No Change	NA	No Change	1/Day	No Change	Grab	No Change	
Fecal Coliform	0.030 MGD	200 N / 100 mL (Geometric Mean)		No Change		NA		No Change		NA	No Change	NA	NL	1/Week (between 10am and 4pm)	4/Month (between 10am and 4pm)	Grab	No Change	Monitoring frequency changed in accordance with current agency guidance (Permit Manual, Section MN-3, Pg. 37-38, rev. January 27, 2010). Monitoring and reporting for maximum values added as Best Engineering Judgment to aid in the detection and correction of possible disinfection problems. See Item 16 for further information
	0.040 MGD																	
	0.080 MGD																	
Enterococci	0.030 MGD	35 N / 100 mL (Geometric Mean)		No Change		NA		No Change		NA	No Change	NA	NL	2/Month	4/Month (between 10am and 4pm)	Grab	No Change	
	0.040 MGD													2/Month				
	0.080 MGD													1/Week				

Table 4: Changes to Limitations and Monitoring (Part I.A.)

EFFLUENT CHARACTERISTICS	APPLICABLE DESIGN FLOW	DISCHARGE LIMITATIONS								MONITORING REQUIREMENTS				REASON FOR CHANGE
		MONTHLY AVG.		WEEKLY AVG.		MINIMUM		MAXIMUM		FREQUENCY		SAMPLE TYPE		
		From	To	From	To	From	To	From	To	From	To	From	To	
Total Phosphorus-Annual Average	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	Due to changes to, or promulgation of, 9 VAC 25-40 (Policy for Nutrient Enriched Waters), 9 VAC 25-720 (Water Quality Management Plan), § 62.1-44.19:15 of the Code of Virginia, 9 VAC 25-820 (General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia), and associated implementation guidance (GM07-2008), the limitations and monitoring associated with Chesapeake Bay nutrients have been revised, added, or removed as indicated. See Item 16 of this fact sheet for further information regarding the 2012 nutrient limitations and monitoring requirements. Please note that 'Year-to-Date' monitoring and reporting in the 2006 permit was for loading whereas the 2012 permit requires concentration.
	0.040 MGD	1.0 mg/L	1.9 mg/L	NA	No Change	NA	No Change	NA	No Change	1/Year	No Change	Calculated	No Change	
	0.080 MGD	1.0 mg/L	0.9 mg/L											
Total Nitrogen-Annual Average	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	8.0 mg/L	14 mg/L	NA	No Change	NA	No Change	NA	No Change	1/Year	No Change	Calculated	No Change	
	0.080 MGD	8.0 mg/L	7.0 mg/L											
Total Phosphorus – Year-to-Date	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NA	NL	NA	No Change	NA	No Change	NL	NA	1/Year	No Change	Calculated	No Change	
	0.080 MGD													
Total Nitrogen– Year-to-Date	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NA	NL	NA	No Change	NA	No Change	NL	NA	1/Year	No Change	Calculated	No Change	
	0.080 MGD													
Total Nitrogen as N	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NA	Removed	NA	Removed	NA	Removed	2/Month	Removed	Calculated	Removed	
	0.080 MGD													
Total Nitrogen (kg/month)	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NA	Removed	NA	Removed	NA	Removed	NL	Removed	1/Month	Removed	Calculated	Removed	
	0.080 MGD													
Total Nitrogen (kg/calendar year)	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NA	Removed	NA	Removed	783	Removed	1/Year	Removed	Calculated	Removed	
	0.080 MGD													
Total Kjeldahl Nitrogen as N (TKN)	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NL	Removed	NA	Removed	NA	Removed	1/Month	Removed	Calculated	Removed	
	0.080 MGD													
Nitrate+Nitrite (as N)	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NA	Removed	NA	Removed	NA	Removed	2/Month	Removed	Grab	Removed	
	0.080 MGD													
Total Phosphorus (kg/month)	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NA	Removed	NA	Removed	NA	Removed	NL	Removed	1/Month	Removed	Calculated	Removed	
	0.080 MGD													
Total Phosphorus (kg/calendar year)	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NA	Removed	NA	Removed	104	Removed	1/Year	Removed	Calculated	Removed	
	0.080 MGD													
Orthophosphate	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NA	Removed	NA	Removed	NA	Removed	2/Month	Removed	Grab	Removed	
	0.080 MGD													
Total Phosphorus	0.030 MGD	---	---	---	---	---	---	---	---	---	---	---	---	
	0.040 MGD	NL	Removed	NA	Removed	NA	Removed	NA	Removed	2/Month	Removed	Grab	Removed	
	0.080 MGD											4 HC		

Table 5: Other Changes to 2006 Permit

	From	To	Permit Section Changed	Reason for Change	Date
Changes to Part I.A (0.030 MGD)	Part I.A.1	Part I.A.1	Authorization statement	Language enhanced for acuity purposes.	
	Part I.A.1.a	Part I.A.1(a)	Design flow footnote	95% Capacity Reopener reference changed due to permit structural change. Language enhanced for acuity purposes.	12/11
	--	Part I.A.1(b)	Significant figures footnote	New, reflects changes made in agency procedure due to GM06-2016	
	Part I.A.1.b	Part I.A.1(c)	Additional TRC Requirements footnote	Revised for acuity purposes.	
	--	Part I.A.1(d)	Bacterial monitoring criteria footnote	New, regional addition in order to enhance monitoring frequency criteria description for bacteria as defined in GM10-2003.	
	Part I.A.1.d	Part I.A.1(e)	Compliance Schedule Reference footnote	Revised to match 2012 permit structure.	
	Part I.A.2	Part I.A.2	No discharge floating solids/foam	No Change	
	Part I.A.3	Part I.A.3	85% removal BOD_5 & TSS	No Change	
Changes to Part I.A (0.040 MGD)	Part 1.A.4	Part I.A.4	Authorization statement	Language enhanced for acuity purposes.	
	Part I.A.4.a	Part I.A.4(a)	Design flow footnote	95% Capacity Reopener reference changed due to permit structural change. Language enhanced for acuity purposes.	
	--	Part I.A.4(b)	Significant figures footnote	New, reflects changes made in agency procedure due to GM06-2016	
	Part I.A.4.b	Part I.A.4(c)	Additional TRC Requirements footnote	Revised for acuity purposes.	
	--	Part I.A.4(d)	Bacterial monitoring criteria footnote	New, regional addition in order to enhance monitoring frequency criteria description for bacteria as defined in GM10-2003.	
	--	Part I.A.4(e)	Watershed GP Reference	New, added to reflect current agency guidance for significant dischargers of nutrients (GM07-2008, Amnd.2)	
	Part I.A.4.d	Part I.A.4(f)	Total Nitrogen derivation	No Change	
	Part I.A.4.f	Part I.A.4.(g)	Nutrient reporting requirements reference	Wording revised due to permit structure changes and for clarity.	
	Part I.A.5	Part I.A.5	No discharge floating solids/foam	No Change	
	Part I.A.6	Part I.A.6	85% removal BOD_5 & TSS	No Change	
Changes to Part I.A (0.080 MGD)	Part 1.A.7	Part I.A.7	Authorization statement	Language enhanced for acuity purposes.	
	Part I.A.7.a	Part I.A.7(a)	Design flow footnote	95% Capacity Reopener reference changed due to permit structural change. Language enhanced for acuity purposes.	
	--	Part I.A.7(b)	Significant figures footnote	New, reflects changes made in agency procedure due to GM06-2016	
	Part I.A.7.c	Part I.A.7(c)	Additional TRC Requirements footnote	Revised for acuity purposes.	
	--	Part I.A.7(d)	Bacterial monitoring criteria footnote	New, regional addition in order to enhance monitoring frequency criteria description for bacteria as defined in GM10-2003.	
	--	Part I.A.7(e)	Watershed GP Reference	New, added to reflect current agency guidance for significant dischargers of nutrients (GM07-2008, Amnd.2)	

	From	To	Permit Section Changed	Reason for Change	Date
	Part I.A.7.e	Part I.A.7(f)	Total Nitrogen Derivation	No Change	
	Part I.A.7.g	Part I.A.7.(g)	Nutrient reporting requirements reference	Wording revised due to permit structure changes and for clarity.	
	Part I.A.8	Part I.A.8	No discharge floating solids/foam	No Change	
	Part I.A.9	Part I.A.9	85% removal BOD_5 & TSS	No Change	
Special Conditions Added or Modified	Part I.B	Part I.B	Additional TRC Limitations and Monitoring Requirements	Wording and monitoring frequency description revised for acuity purposes. Fecal coliform monitoring added if disinfection other than chlorination is used. Bacteria demonstration requirements removed. See Item 16 of this fact sheet for further information regarding the 2006 bacterial demonstration study for Enterococci.	
	Part I.C	Part I.C.1	Compliance Schedule	Ammonia compliance schedule replaced with dissolved oxygen compliance schedule to reflect new 2012 limitation. Wording revised to reflect current agency guidance (GM10-2003).	
	Part I.D.1	Part I.C.2	95% Capacity Notification	DEQ-PRO address has been removed in accordance with agency boilerplate contained in GM10-2003	
	Part I.D.4	Part I.C.3	O & M Manual	Revised to reflect 4/3/2012 boilerplate developed by OWP&CA.	
	Part I.D.5	Part I.C.4	Licensed Operator	No Change	
	Part I.D.6	Part I.C.5	Reliability Class	No Change	
	Part I.D.12	Part I.C.6	Sludge Use and Disposal	Revised to reflect current agency guidance (GM10-2003).	
	Part I.D.9	Part I.C.7	Sludge Reopener	No Change	
	Part I.D.11	Part I.C.8	Compliance Reporting	Revised to reflect current agency guidance (GM10-2003). Language further revised according to regional procedure and for clarity purposes. BOD_5 QL revised from 5 mg/L to 2 mg/L for consistency with recently adopted VPDES General Permit regulations. QL's for TKN, Nitrate+Nitrite, and TP and Orthosphosphate removed because monitoring and QL's for these parameters are controlled by the Watershed GP.	
	Part I.D.10	Part I.C.9	Materials Handling/Storage	Revised to reflect current agency guidance (GM10-2003).	
	Part I.D.13/ Part I.D.17	Part I.C.10	TMDL/Nutrient Reopener	Language revised to reflect current agency guidance (GM07-2008 Amnd.2). Revised language addresses both nutrient reopener and TMDL reopener.	
	Part I.D.2	Part I.C.11	Indirect Dischargers	No Change	
	Part I.D.3	Part I.C.12	CTC, CTO Requirement	Revised wording to reflect current agency guidance (GM10-2003) and current nutrient guidance (GM07-2008, Amnd.2)	
	Part I.D.14	Part I.C.13	Nutrient Reporting Calculations	Revised to reflect current agency nutrient guidance (GM07-2008, Amnd.2)	
	--	Part I.C.14	Suspension of Annual Average Concentration Limitations for E3/E4 Facilities	New, added in accordance with current agency nutrient guidance (GM07-2008, Amnd.2).	
	Part I.D.7	Part I.C.15	Financial Assurance	Wording revised to match current agency boilerplate (GM10-2003). Title of special condition enhanced to reflect that Financial Assurance requirements only apply to the 0.030 MGD plant.	
	--	Part I.C.16	Treatment Works Closure Plan	New, reflects SCAT regulations requirements (9 VAC 25-790-120 E.)	

	From	To	Permit Section Changed	Reason for Change	Date
	Part I.D.18	Part I.C.17	Water Quality Criteria Monitoring and Attachment A	Revised in accordance with GM10-2003.	
	Part I.D.19	Part I.C.18	Construction Activity Restriction	No Change	
	--	Part II.A.4	VELAP requirements	New, incorporated to reflect change in laboratory accreditation requirements.	
Part I.A Footnotes Removed	Part I.A.1.c	Removed	Compliance Reporting Special Condition Reference	Reference to this special condition is unnecessary.	
	Part I.A.4.c	Removed	Compliance Reporting Special Condition Reference	Reference to special condition is unnecessary.	
	Part I.A.4.e	Removed	2/Month Monitoring Instructions	All parameters requiring 2/Month monitoring have been removed from the 2012 permit.	
	Part I.A.4.g	Removed	Offsetting nutrient loads in excess of the 2006 individual nutrient load limitation.	Nutrient load limitations and offset requirements are addressed in the permittee's Watershed GP.	
	Part I.A.7.b	Removed	Totalizing, Indicating, and Recording Equipment	Incorporated into the Part I.A.4 limitations and monitoring table.	
	Part I.A.7.d	Removed	Compliance Reporting Special Condition Reference	Reference to special condition is unnecessary.	
	Part I.A.7.f	Removed	2/Month Monitoring Instructions	All parameters requiring 2/Month monitoring have been removed from the 2012 permit.	
	Part I.A.7.h	Removed	Offsetting nutrient loads in excess of the 2006 individual nutrient load limitation.	Nutrient load limitations and offset requirements are addressed in the permittee's Watershed GP.	
Special Conditions Removed	Part I.D.8	Removed	Water quality criteria monitoring reopener	Removed, there are no 'monitoring-only' parameters in the 2012 permit except for Attachment A, which is addressed by Part I.C.17 and contains reopener language which allows DEQ to insert limitations if monitoring indicates a need to do so.	
	Part I.D.15	Removed	Watershed GP Special Condition	The permittee has acquired coverage under the Watershed GP.	
	Part I.D.16	Removed	Nutrient reduction credits special condition	Nutrient load limitations and offset requirements are addressed in the permittee's Watershed GP.	
Changes to Cover Page	The structure and language of the cover page have been slightly modified in accordance with new agency procedures and for streamlining purposes. Signatory requirements have also changed in accordance with the October 2008 DEQ Agency Policy Statement 2-09, "Delegations of Authority". Facility ownership has changed, see **Attachment H** for ownership change information. Expiration date of permit has been shortened from an exact 5 year expiration in order for the next permit term to begin with a complete calendar month.				

22. Variances/Alternate Limits or Conditions: None.

23. Regulation of Users: 9VAC25-31-280 B 9: There are no industrial users contributing to the treatment works.

24. Public Notice Information required by 9 VAC 25-31-280 B:

Comment period: Start Date: May 24, 2012 End Date: June 25, 2012
Published Dates: May 24, 2012 and May 31, 2012
Name of Newpaper: *Rappahannock Record*

All pertinent information is on file and may be inspected or copied by contacting Jeremy Kazio at:

Virginia Department of Environmental Quality (DEQ)
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DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. The public may review the draft permit and application at the DEQ Piedmont Regional Office by appointment.

25. 303(d) Impaired Waters / Total Maximum Daily Load (TMDL):

During the 2010 305(b)/303(d) Water Quality Assessment, the boat basin was considered a Category 5A water ("A Water Quality Standard is not attained. The water is impaired or threatened for one or more designated uses by a pollutant(s) and requires a TMDL (303d list)." The Aquatic Life Use is impaired due to low dissolved oxygen in the Rappahannock River mesohaline estuary (RPPMH). The Recreation-, Fish Consumption-, and Wildlife Uses are not assessed. The boat basin is under a VDH Shellfish Prohibition, therefore the Shellfish Use is considered to be removed.

The Windmill Point Resort was included in the Chesapeake Bay TMDL, which was approved by the EPA on 12/29/2010. The facility was included in the aggregated total nitrogen, total phosphorus, and total suspended solids wasteload allocations for nonsignificant wastewater dischargers in the Corrotoman River mesohaline estuary (CRRMH). This was an error as the facility is actually located in RPPMH. The permit may be reissued and the location will be corrected later in the TMDL (Fred Cunningham, 4/13/11).

a. *Chesapeake Bay TMDL:* This facility discharges directly to the Windmill Point boat basin in the Chesapeake Bay watershed in segment RPPMH. The receiving stream has been addressed in the Chesapeake Bay TMDL, approved by EPA on December 29, 2010. The TMDL addresses dissolved oxygen (DO), chlorophyll a, and submerged aquatic vegetation (SAV) impairments in the main stem Chesapeake Bay and its tidal tributaries by establishing non-point source load allocations (LAs) and point-source waste load allocations (WLAs) for Total Nitrogen (TN), Total Phosphorus (TP) and Total Suspended Solids (TSS) to meet applicable Virginia Water Quality Standards contained in 9VAC25-260-185.

   Implementation of the Chesapeake Bay TDML is currently accomplished in accordance with the Commonwealth of Virginia's Phase I Watershed Implementation Plan (WIP), approved by EPA on December 29, 2010. The approved WIP recognizes the "General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed of Virginia" (9VAC25-820) as controlling the nutrient allocations for non-significant Chesapeake Bay dischargers. The approved WIP states that

for non-significant Municipal and Industrial facilities, nutrient WLAs are to be consistent with Code of Virginia procedures, which set baseline WLAs to 2005 permittee design capacity nutrient levels. §62.1-44.19:15 of the Code of Virginia further states that an owner or operator of a facility authorized by a VPDES permit first issued before July 1, 2005 that expands their facility to discharge 40,000 gallons or more per day up to and including 99,999 gallons per day into tidal or non-tidal waters shall demonstrate they have acquired WLAs sufficient to offset any increase in delivered nutrient loads resulting from the expansion. In accordance with the WIP, TN and TP (load-based) WLAs for non-significant facilities are considered aggregate allocations and will not be included in individual permits. The WIP also considers TSS WLAs for non-significant facilities to be aggregate allocations, but TSS limits are to be included in individual permits in conformance with the technology-based requirements of the Clean Water Act. However, the WIP recognizes that so long as the aggregated TSS permitted loads for all dischargers is less than the aggregated TSS load in the WIP, the individual permit will be consistent with the TMDL.

40 CFR 122.44(d)(1)(vii)(B) requires permits to be written with effluent limits necessary to meet water quality standards and to be consistent with the assumptions and requirements of applicable WLAs. This facility is considered a non-significant Chesapeake Bay discharger because it is an existing facility with a permitted design flow of less than 100,000 gallons per day into tidal waters. The 2012 permit includes an expansion tier authorizing discharge flows greater than the (30,000 gpd) design flow of the facility as of July 1, 2005 and greater than the §62.1-44.19:15 threshold of 40,000 gallons per day, The facility is therefore subject to, and DEQ has provided coverage under, the VPDES Nutrient General Permit (GP) for this facility under permit VAN020115. The requirements of the Nutrient GP currently in effect for this facility are consistent with the Chesapeake Bay TMDL. This individual permit includes TN and TP effluent concentration limits for each expansion tier to ensure no increase in delivered nutrient loads resulting from the expansion compared with the facility's 2005 permitted design capacity loads. This individual permit includes technology-based TSS limits of 30 mg/L that are also consistent with the Chesapeake Bay TMDL and WIP. In addition, the individual permit has limits of 30 mg/L BOD_5 and 5.0 mg/L minimum DO. Given these limits, this facility can neither cause nor contribute to an observed violation of the standards, and is consistent with the TMDL.

This facility was mistakenly included in the aggregated loadings assigned to the Corrotoman River segment CRRMH rather than the RPPMH segment during development of the CB TMDL. Notification has been provided to OWP&CA and it has been assured (via email from OWP&CA on 4/13/2011) that this facility will be tracked and incorporated into the correct segment in the CB TMDL at a later date. It is anticipated that there is currently adequate aggregated nutrient loadings available in the RPPMH segment to allow for the addition of this facility's discharge and that compliance with the CB TMDL will be maintained. Please see page 26 (first paragraph), page 38 (third paragraph), and page 40 (fourth paragraph) of the WIP for information regarding new or expanded non-significant dischargers within aggregated segments.

b. *Dissolved Oxygen (DO):* The 2012 permit has limitations of 30 mg/L BOD_5, and minimum 5 mg/L DO as recommended in the currently applicable Stream Sanitation Analysis. These limitations were determined to be protective of water quality within the receiving waterbody, and therefore, are not expected to cause nor contribute to the existing DO impairment.

c. *Shellfish Prohibition:* As stated above, this facility discharges to a waterbody that is under a shellfish prohibition. Regardless, a limitation for fecal coliform has been included in the 2012 permit to address protection of the shellfish use (see Item 16 of this fact sheet).

26. Additional Comments:

a. Previous Board Action: None

b. Staff Comments:

- A monitoring frequency reduction was not considered for this facility due to the facility's recent ownership changes. The most current owners purchased this facility on January 26, 2012 and have not established the minimum three year compliance history necessary for consideration for a monitoring frequency reduction. This decision is based on Best Professional Judgment in accordance with GM10-2003, Section MN-2, Page 4.

- One of this facility's SIC codes (4493) designates it as a marina, which is an industrial sector that is subject to regulation under DEQ's Industrial Storm Water General Permit (ISWGP). However, the specific activities which are regulated by the ISWGP (i.e. dry dock, boat maintenance, and/or boat repair) are not conducted onsite, and therefore regulation of the storm water runoff from these activities is not required. The 2012 permit also requires (see Part I.C.3 and Part I.C.9) the permittee to implement Best Management Practices for all activities onsite in order to prevent discharge of wastes to State waters. Additionally, facilities treating domestic effluent which discharge greater than or equal to 1.0 MGD are subject to storm water requirements. Since this facility's design flow is 0.030 MGD, storm water requirements are not applicable.

- Applicable riparian owners and local government officials were notified of the permittee's request to incorporate expansion tiers into the 2006 permit during the 2006 permit reissuance.

- The permittee is up to date on his Financial Assurance obligations (3/2/2012 email, Suzanne Taylor).

- Coordination with the Virginia Department of Health –Division of Shellfish Sanitation indicated that the existing discharge would not cause any change to the existing shellfish closures within this facility's receiving water body. The Virginia Department of Health-Office of Drinking Water indicated that they had no objection to the permit reissuance.

- This permit reissuance is non-controversial. The staff believes that the attached effluent limitations will maintain the Water Quality Standards adopted by the Board.

- The discharge is in conformance with the existing planning documents for the area.

- EPA has waived the right to comment and/or object to the adequacy of the permit.

- The permittee last paid their annual maintenance fee on 7/12/2011. All delinquent maintenance fees and penalties have been paid.

- The permit expired before reissuance due to the former owner's non-payment of the FY-2010 and FY-2011 annual maintenance fees as well as not maintaining his Financial Assurance mechanism.

- The permittee is not a participant in the Virginia Environmental Excellence Program (VEEP)

- The permittee is not currently an e-DMR participant. The permittee was notified of the expectation to participate in the e-DMR program on 10/18/2010.

- A copy of the public notice for the 2012 permit reissuance was mailed to the Northern Neck Planning District Commission, the County Administrator, and the Chairman of the Board of Supervisors on May 21, 2012. No comments regarding the permit action were received.

c. Public Comments: No comments were received during the public comment period.

27. Summary of attachments to this Fact Sheet:

Attachment A	Flow Diagram, Proposed Expansion, and Topographic Map
Attachment B	Ambient Stream Data
Attachment C	Flow Frequency Memo and 303(d) Fact Sheets
Attachment D	Site Inspection Report
Attachment E	Stream Sanitation Analyses
Attachment F	DMR and Form 2A Effluent data
Attachment G	MSTRANTI and STATS printouts, Nutrient Limitations Email
Attachment H	Ownership Change Documentation and Related Correspondence

Attachment A

Flow Diagram, Proposed Expansion, and Topographic Map

Attachment A1

N

0 0.75 Mi

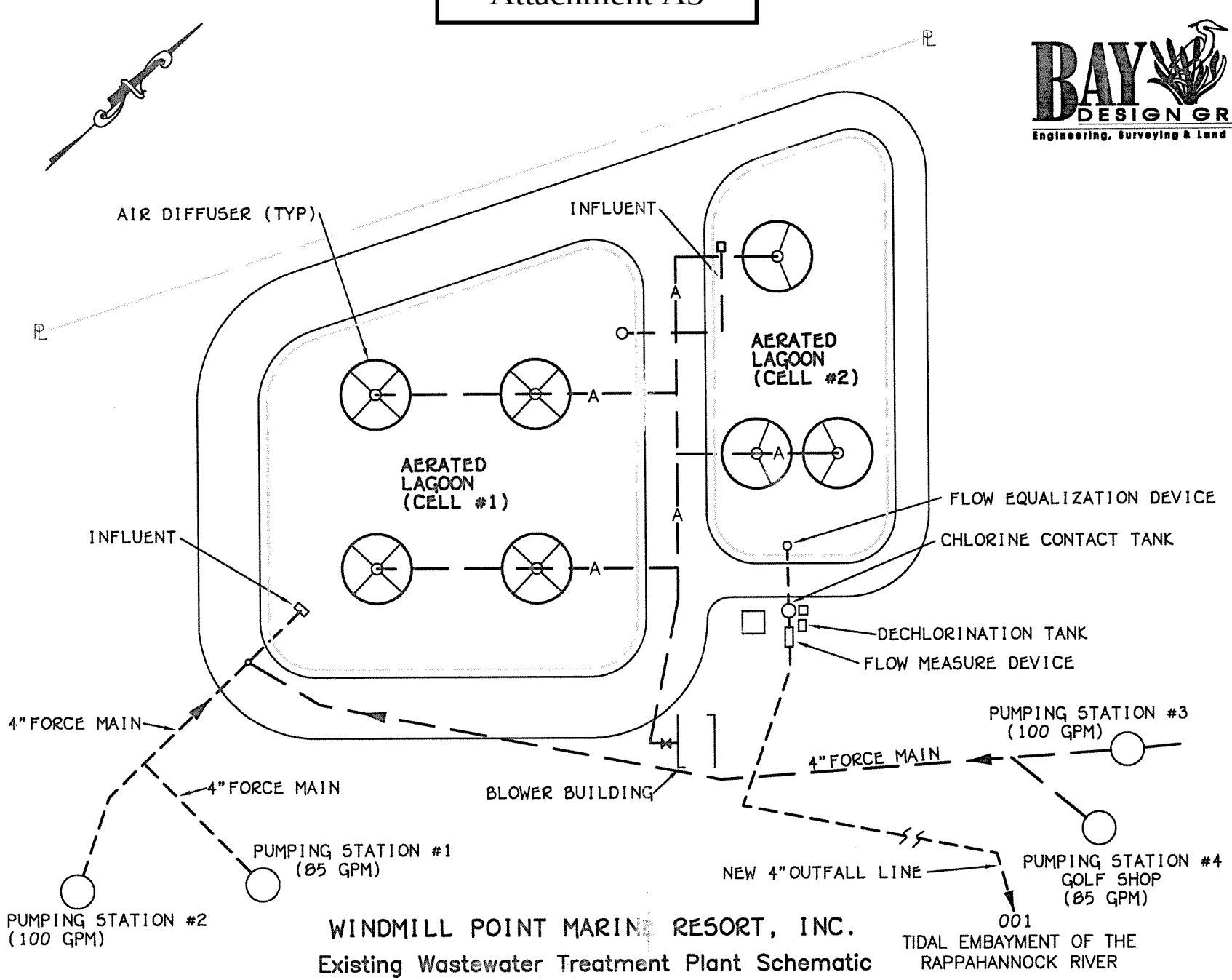
0 4000 Ft

Map provided by MyTopo.com

4/13/2011

Attachment A2

Attachment A3



WINDMILL POINT MARINE RESORT, INC.

Existing Wastewater Treatment Plant Schematic

SCALE: 1"=50'

Attachment A4

WINDMILL POINT RESORT & YACHT CLUB, INC. VPDES # VA0060569

Existing and proposed Phase One development *

1. The sewer system will serve the following upon completion of Phase One of the construction:

A. The Landing; 35 units @ 300 GPD ..... 10,500 GPD

B. Beach Cove Villas; 24 units @ 300 GPD ..... 7,200 GPD

C. The Point; 14 units @ 400 GPD ..... 5,600 GPD

D. Restaurant; 100 seats @ 50 GPD ..... 5,000 GPD

E. Marina;

(1) Transient slips; 25 @ 32 GPD ..... 800 GPD

(2) Seasonal slips; 99 @ 20 GPD ..... 1,980 GPD

(3) Seasonal slips; 26 @ 32 GPD ..... 832 GPD

F. Total daily flow ..... 31,912 GPD

Proposed Phase 2 Residential Condominiums

1. The sewer system will serve an additional 150 residential units; 150 @ 300 GPD ..... 45,000 GPD

Total wastewater flow for Existing, Phase One and Phase Two ..... 76,912 GPD

* A block of 52 motel units, which were listed in the 2005 Permit Application, have been demolished.

Attachment A5

Windmill Point Resort & Yacht Harbor, Inc.
VPDES # VA 0060569

Proposed Flow Narrative

The proposed plant will have the following flow pattern:

1. Influent wastewater from the collection system will enter the plant and go through a sewage grinder, an inclined filtration screen, then pass to the equalization tank. Screenings will be automatically collected, dewatered, and bagged for disposal.

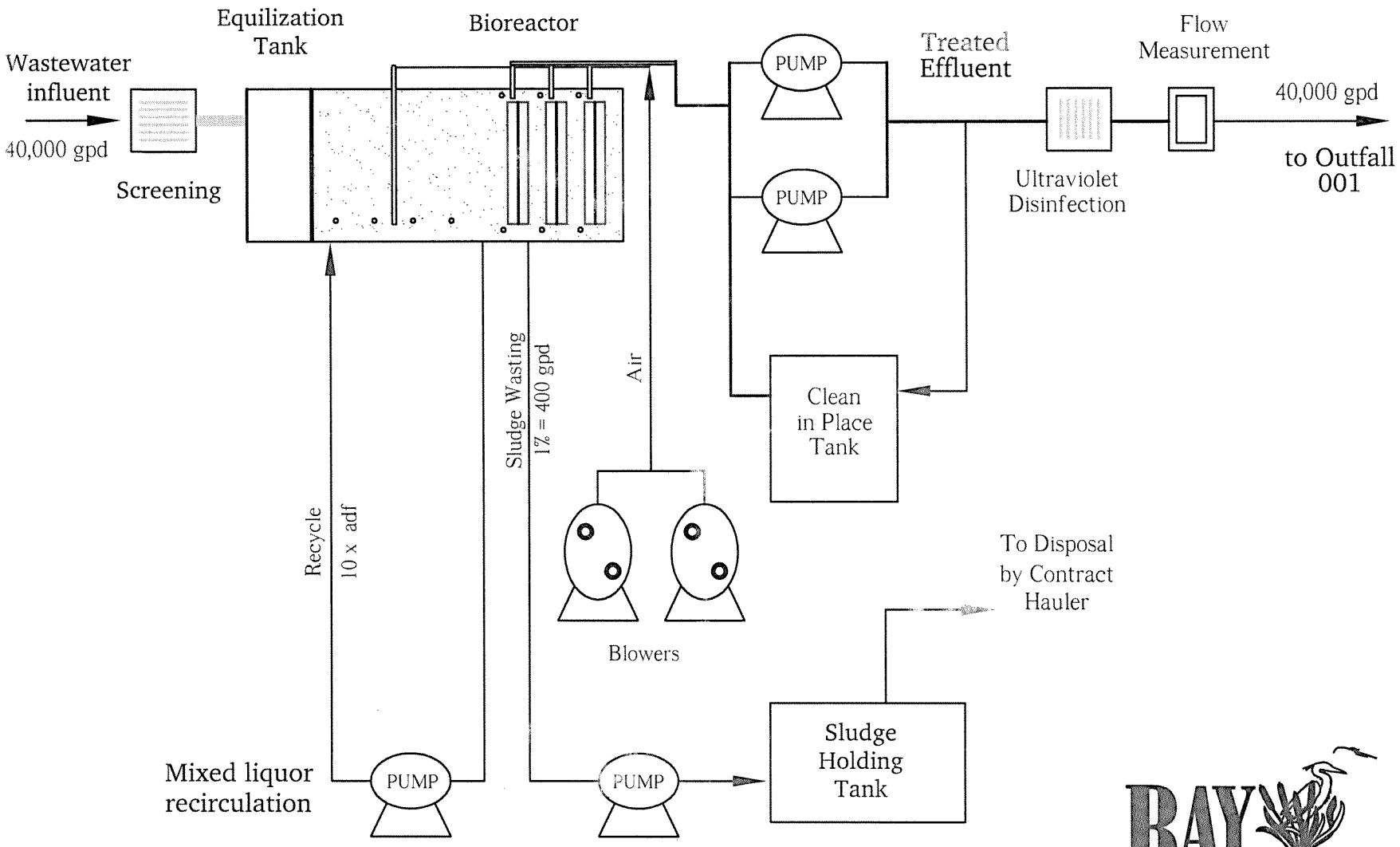
2. The flow will enter the equalization tank and be aerated to preserve its qualities.

3. The wastewater will then flow to the suspended growth bioreactor and then to the membrane filter for solids reduction. The influent end of the bioreactor provides an anoxic zone to assist with pH and denitrification. The rest of the bioreactor is supplied with a fine bubble aeraion system and blowers.Phosphorous will be removed by addition of a metallic salt. Solids collected from the bioreactor section will be recirculated to the influent as a mixed liquor at a rate of 10 X ADF. Mixed liquor wasting will be preformed as needed by flow and waste characteristics. It will be stored in a holding tank for periodic disposal by a contract hauler.

4. Filter effluent flows to the Ultraviolet light system for disinfection.

5. Flow then is measured by an ultra sonic flow meter and discharged through Outfall # 001 into the Rappahannock River.

Z-Mod MBR Schematic
Proposed



BAY DESIGN GROUP
Engineering, Surveying & Land Planning

Attachment A6

Attachment B

Ambient Stream Data

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
7/11/1984	3	24		6.2	
7/11/1984	5	24		3.4	
7/11/1984	7	24		3.4	
7/11/1984	9	23.9		2.6	
7/11/1984	11	24		2.2	
7/11/1984	13	24		2.2	
7/11/1984	15			1.6	
7/11/1984	17			1.3	
7/11/1984	19			1.2	
7/11/1984	20.99	24.4		1	
7/11/1984	1	24.4		6.2	
8/9/1984	3	28.62		7.1	
8/9/1984	5	28.47		6.8	
8/9/1984	7	27.8		3.8	
8/9/1984	9	27.34		2.7	
8/9/1984	11	26.86		1.4	
8/9/1984	13	26.47		1.1	
8/9/1984	15	26.36		0.3	
8/9/1984	17	26.07		0.2	
8/9/1984	19	25.95		0.2	
8/9/1984	20.99	25.85		0.2	
8/9/1984	1	28.83		8.2	
8/23/1984	1	26.69	8.1	9.1	9.84
8/23/1984	2	26.76		6.1	9.82
8/23/1984	4	26.97		2	10.56
8/23/1984	6	27.36		1.2	12.18
8/23/1984	8	27.25		0.4	13.42
8/23/1984	10	26.92		0.4	15.16
8/23/1984	12	26.66		0.4	16.02
8/23/1984	14	26.36		0.3	17.2
9/10/1984	1	24.47	8.1	6	
9/10/1984	3	24.47		5.95	
9/10/1984	5	24.56		5.65	
9/10/1984	7	24.79		4.95	
9/10/1984	9	24.83		4.4	
9/10/1984	11	24.8		4.4	
9/10/1984	13	24.81		4.2	
9/10/1984	15	24.91		3.45	
9/10/1984	17	25.09		2.7	
9/10/1984	19	25.41		0.8	
9/10/1984	20.99	25.43	8.1	0.7	
9/27/1984	1	21.8	7.8	6.4	15.7
9/27/1984	3	21.5		6.4	15.7
9/27/1984	5	21.6		6.5	15.7
9/27/1984	7	21.6		4.9	15.8
9/27/1984	8	20.7		5	15.1
10/9/1984	1	18.69	7.6	9.7	
10/9/1984	3	18.67		9.6	
10/9/1984	5	18.73		9.45	
10/9/1984	7	18.67		8.8	
10/9/1984	9	18.56		8.5	
10/9/1984	11	18.69		7.05	
10/9/1984	13	18.71		6.65	
10/9/1984	15	18.75		6.05	
10/9/1984	17	18.76		5.9	
10/9/1984	19	18.78		5.75	
10/9/1984	20.99	18.79		5.05	
10/31/1984	3	20.5		7.5	16.5
10/31/1984	5	20.4		6.2	16.8
10/31/1984	7	20.4		7.4	17.8
10/31/1984	9	19.8		7.3	18.48
10/31/1984	11	19.74		7.5	19.18
10/31/1984	13	19.71		7.7	18.89
10/31/1984	15	19.68		7.8	19.79
10/31/1984	1	20.6	7.9	8	16.46
11/9/1984	3	15.7		7.6	17.5
11/9/1984	5	16		8.8	17.5
11/9/1984	7	16		9	17.4
11/9/1984	9	16		9.1	17.6
11/9/1984	11	15.3		9	17.9
11/9/1984	13	15	7.1	8.9	18.1
11/9/1984	1	15.8	5.4	7.7	17
12/10/1984	1	6.81	7.6	11.4	17.21
12/10/1984	3	6.82		11.3	17.32
12/10/1984	5	6.91		11	17.55
12/10/1984	7	6.96		10.7	18.29
12/10/1984	9	6.97		10.5	19.03
12/10/1984	11	7		10.5	19.36
12/10/1984	13	7.07		10.4	19.28
12/10/1984	15	7.03		10.4	19.48
12/10/1984	17	7.03		10.3	19.6
12/10/1984	19	7.07	7.3	10.2	19.66
2/7/1985	1	0.8	8	15.3	
2/7/1985	3	0.9		15.2	
2/7/1985	5	0.9		15.3	
2/7/1985	7	0.9		15.2	
2/7/1985	9	0.9	7.3	15.2	
3/7/1985	1	6.56	7.6	11.2	15.58
3/7/1985	3	6.68		11.3	15.7
3/7/1985	5	6.69		11.4	15.96
3/7/1985	7	6.41		11.4	16.3
3/7/1985	9	5.06		11.4	16.98
3/7/1985	11	4.94		11.4	17.02
3/7/1985	13	5.29	7.6	11.4	17.06
3/20/1985	1	7.5	8.7	11.6	15.9
3/20/1985	3	7.5		11.6	15.8
3/20/1985	5	7.5		11.5	15.9
3/20/1985	7	7.4		11.4	15.9
3/20/1985	9	7.4	8.5	11.1	16.1
4/8/1985	1	11.69	8.3	10.1	16.28
4/8/1985	3	11.59		10	16.25
4/8/1985	5	11.62		10	16.33
4/8/1985	7	11.68		9.8	16.94
4/8/1985	9	11.76	8.8	9.88	16.87
4/18/1985	1	14.71	7.6	9.55	14.95
4/18/1985	3	14.76		9.5	15
4/18/1985	5	14.84		9.3	15.2
4/18/1985	7	14.33		8.9	15.7
4/18/1985	9	14.03		8.85	15.9
4/18/1985	11	13.79		8.9	16
4/18/1985	13	13.6		8.9	16.1
4/18/1985	15	13.53		8.85	16.1
4/18/1985	17	13.4		8.8	16.2
4/18/1985	19	13.82		8.8	16
4/18/1985	20.99	13.49	7.8	8.75	16
5/6/1985	0.3	17.9	7.4		
5/6/1985	1	17.88	7.4	7.6	16.47
5/6/1985	3	17.97		7.6	16.52
5/6/1985	5	17.89		7.6	16.5
5/6/1985	7	17.87		7.5	16.46
5/6/1985	9	17.84		7.4	16.49
5/6/1985	10	17.84	7.1	7.4	16.58
5/16/1985	1	21.16	7.8	7.5	16.74
5/16/1985	3	20.62		7.6	17.06
5/16/1985	5	20.6		7.5	17.1
5/16/1985	7	20.52		7.1	17.02
5/16/1985	9	20.08		6.4	17.29
5/16/1985	11	18.1		5	18.1
5/16/1985	13	18.1		5.1	18.6
5/16/1985	15	17.84		5.2	18.8
5/16/1985	17	17.88	7.5	5.2	19.28
6/3/1985	1	22.9	7.9	7.6	16.72
6/3/1985	3	22.7		6.7	16.7
6/3/1985	5	22.48		5.4	16.9
6/3/1985	7	21.81		5.5	17.14
6/3/1985	9	21.88		5.2	17.3
6/3/1985	11	21.62		4.8	17.72
6/3/1985	13	21.3		4.6	18.24
6/3/1985	15	21.18		4.5	19
6/3/1985	17	21.1		4.5	19
6/3/1985	18	21.02	7.79	4.5	19.1
6/18/1985	1	24	6.8	6	16.98
6/18/1985	3	24		5.9	17
6/18/1985	5	24		5.8	17.06
6/18/1985	7	23.86		5.7	17.1
6/18/1985	9	23.26		3.6	19.13
6/18/1985	11	23.1		3.1	19.58
6/18/1985	13	23.02		3.1	19.8
6/18/1985	15	23		3.2	19.93
6/18/1985	17	23		2.9	20.38
6/18/1985	19	29.98		2.8	20.5
6/18/1985	20.99	22.94		2.7	20.6
6/18/1985	22.99	22.9	6.6	2.6	20.7
7/1/1985	1	24.3	8.1	6.53	18.48
7/1/1985	3	24.4		6.56	18.6
7/1/1985	5	24.3		6.06	18.56
7/1/1985	7	24.2		6.06	18.7
7/1/1985	9	24.1	8.6	6.35	18.6
7/23/1985	1	26.6	7.82	6.8	17.25
7/23/1985	3	26.93		6.6	17.2
7/23/1985	5	26.89		6.3	17.1
7/23/1985	7	26.83		5.8	17.1
7/23/1985	9	26.72		4	17.2
7/23/1985	11	26.58		2.5	17.4
7/23/1985	13	26.32		1.6	17.6
7/23/1985	15	26.18		1.2	17.7
7/23/1985	17	26.08		1	17.7
7/23/1985	19	26.08		1.8	17.8
7/23/1985	20.99	26.29		3	18.1
7/23/1985	21.99		7.42	3	18.1
8/1/1985	1	27.3	7.72	6.3	19.2
8/1/1985	3	26.9		6.3	19.3
8/1/1985	5	26.8		6.1	19.2
8/1/1985	7	26.5		5.2	19.7
8/1/1985	9	26.4	7.58	4.2	20.2
8/14/1985	1	27.8	8.09	7.3	19.32
8/14/1985	3	27.8		7.2	19.32
8/14/1985	5	27.68		6.8	19.32
8/14/1985	7	27.01		4.5	19.96
8/14/1985	9	26.64		3.7	20.26
8/14/1985	11	26.32		2.8	20.94
8/14/1985	13	26.11		2.3	21.22
8/14/1985	15	25.91		1.8	21.62
8/14/1985	17	25.8		1.6	21.92
8/14/1985	19	25.81		1.6	22
8/14/1985	20.99	25.78		1.6	22.12
8/14/1985	22.99	25.73	7.16	1.4	22.24
9/3/1985	1	26.52	7.68	6.8	19.12
9/3/1985	3	26.44		6.6	19.14
9/3/1985	5	26.44		6.3	19.21
9/3/1985	7	26.42		5.7	19.22
9/3/1985	8	26.48	6.49	5	19.8
9/16/1985	1	24.67	7.9	4.9	19.48
9/16/1985	3	24.68		4.9	19.5
9/16/1985	5	24.76		4.8	19.47
9/16/1985	7	24.78		4.8	19.48
9/16/1985	9	24.75		4.7	19.6
9/16/1985	11	24.85		4.7	19.57
9/16/1985	13	23.02		4.7	20.68
9/16/1985	15	21.86		4.6	20.74
9/16/1985	17	22.04		4.7	20.66
9/16/1985	18	22.38	7.77	4.7	20.48
10/1/1985	1	22.18	7.82	7.2	18.35
10/1/1985	3	22.1		7.1	18.35
10/1/1985	5	22.1		7.1	18.25
10/1/1985	7	22.3		7	19.1
10/1/1985	9	22.25		6.1	19.5
10/1/1985	11	22.4		5.9	19.88
10/1/1985	13	22.25		5.8	19.8
10/1/1985	15	22.1		5.7	19.89
10/1/1985	17	22.05		5.6	19.95
10/1/1985	19	22.15	7.59	5.6	20.25
10/15/1985	1	21	7.51	6.3	21
10/15/1985	3	21.2		6.3	21
10/15/1985	5	21		6.3	21
10/15/1985	7	21		6.3	21
10/15/1985	9	21	7.75	6.4	21.38
11/14/1985	1	16.46	7.09	8.3	15.58
11/14/1985	3	16		7	18.2
11/14/1985	5	16		6.8	19.48
11/14/1985	7	15.94		6.5	20.8
11/14/1985	9	15.96		6.7	21.2
11/14/1985	11	16		6.8	21.16
11/14/1985	13	15.96		6.8	21.3
11/14/1985	15	16		6.9	21.4
11/14/1985	17	15.98		6.9	21.4
11/14/1985	19	15.98		7.2	21.5
11/14/1985	19.99	15.92	7.46	7.4	21.46
12/16/1985	1	8.14	8.97	9.6	17
12/16/1985	3	8.16		9.5	16.88
12/16/1985	5	8.42		9.5	17.1
12/16/1985	7	8.48		9.4	17.24
12/16/1985	9	8.6	8.8	9.4	17.42
1/22/1986	1	2.92	8.39	12.6	16.36
1/22/1986	3	3		12.5	16.72
1/22/1986	5	3.06		12.4	17.12
1/22/1986	7	3.02		12.2	17.08
1/22/1986	9	2.99		11.9	18.49
1/22/1986	11	2.89	8.44	11.9	18.72
2/18/1986	1	3.09	8.36	14.2	15.32
2/18/1986	3	2.88		13.8	15.68
2/18/1986	5	2.78		13.3	16
2/18/1986	7	2.24		13	17.31
2/18/1986	9	2.46		12.6	18.1
2/18/1986	11	2.5	8.2	12.5	18.54
3/11/1986	1	4.5	8.04	12.1	15.05
3/11/1986	3	4.7		12	15.2
3/11/1986	5	4.6		12	15.1
3/11/1986	7	4.4		12.3	15
3/11/1986	9	4.7		12.2	15.2
3/11/1986	11	3.8		11.9	16.04
3/11/1986	13	3.7		11.6	16.9
3/11/1986	15	3.49		11.4	16.8
3/11/1986	17	3.5		11.2	17.3
3/11/1986	19	3.6		11.2	17.3
3/11/1986	20.99	3.7	7.83	11.1	17.59
3/25/1986	1	8.23	8.7	11.4	13.9
3/25/1986	3	8.71		11.1	14.24
3/25/1986	5	8.6		11	14.35
3/25/1986	7	8.38		10.8	14.83
3/25/1986	9	7.94		10.5	15.46
3/25/1986	11	7.48		10.4	15.7
3/25/1986	13	7.33		10.3	15.9
3/25/1986	15	7.32		10.3	15.8
3/25/1986	17	7.18		10.2	15.94
3/25/1986	19	6.84		10.2	16.1
3/25/1986	20.99	6.1		10.1	16.56
3/25/1986	22.99	5.7		10.1	15.3
3/25/1986	24.99	5.56		10.2	14.48
3/25/1986	25.99	5.58	8.6	10.3	15.18
4/9/1986	1	13.62	8.4	11.4	13.98
4/9/1986	3	13.56		11.3	14
4/9/1986	5	13.64		11.3	14.06
4/9/1986	7	13.57		11.2	14.07
4/9/1986	9	12.88		10.9	14.47
4/9/1986	11	12.47		10.6	14.82
4/9/1986	13	12.14	7.82	10.5	14.74
4/24/1986	1	12.16	8.13	9.3	13.78
4/24/1986	3	12.09		9.2	13.88
4/24/1986	5	11.89		9.2	13.8
4/24/1986	7	12.27		9.2	13.84
4/24/1986	9	12.14		9.1	14.09
4/24/1986	11	12.19		9.1	14.04
4/24/1986	13	12.28		8.8	15.66
4/24/1986	15	12.32		8.8	15.38
4/24/1986	17	12.39		8.8	15.32
4/24/1986	19	12.12	8.02	8.6	15.7
5/7/1986	1	17.12	8.18	10.4	13.38
5/7/1986	3	16.72		10.2	13.54
5/7/1986	5	16.32		10.4	13.71
5/7/1986	7	15.71		8.6	14.51
5/7/1986	9	15.04		8.7	15.46
5/7/1986	11	14.19		8.2	17.84
5/7/1986	13	14.05		7.9	18.56
5/7/1986	15	13.94		7.8	19
5/7/1986	17	13.83		7.7	19.14
5/7/1986	19	13.72		7.6	19.53
5/7/1986	19.99	13.84	7.75	7.6	19.44
5/22/1986	1	20.41	7.82	8.1	14.65
5/22/1986	3	20.38		8	14.64
5/22/1986	5	19.8		7.6	14.85
5/22/1986	7	17.87		6.4	16.4
5/22/1986	9	16.85		6.4	17.86

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Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
5/22/1986	11	16.45		6.1	18.2
5/22/1986	13	16.36		6	18.24
5/22/1986	15	16.27		5.9	18.39
5/22/1986	17	16.14		5.9	18.38
5/22/1986	19	16.14		5.9	18.39
5/22/1986	20.99	16.13		5.9	18.42
5/22/1986	22.99	16.09	7.15	5.8	18.5
6/5/1986	1	22.83	7.52	7.7	15.44
6/5/1986	3	22.81		7.6	15.48
6/5/1986	5	22.85		7.4	15.47
6/5/1986	7	22.84		6.6	15.58
6/5/1986	9	21.94		4.4	15.88
6/5/1986	11	20.97		3.3	16.64
6/5/1986	13	20.25		2.9	17.38
6/5/1986	15	20.05		2.9	18.01
6/5/1986	17	19.95		2.8	18.57
6/5/1986	19	19.97		2.8	18.7
6/5/1986	20.99	20.05		2.8	19.07
6/5/1986	21.99	20.04	7.22	2.8	19.18
6/23/1986	1	24.64	7.8	7.9	17.59
6/23/1986	3	24.56		7.8	17.58
6/23/1986	5	24.58		7.6	17.54
6/23/1986	7	24.68		7.5	17.59
6/23/1986	9	24.6		6.8	17.85
6/23/1986	11	24.34		5.1	18.35
6/23/1986	13	24.4		2.9	18.6
6/23/1986	15	24.12		2.2	18.88
6/23/1986	17	24.03		1.8	18.91
6/23/1986	19	24		1.4	19.12
6/23/1986	19.99	24.18	7.15	1.5	19.15
7/7/1986	1	26.38	7.79	6.9	17.78
7/7/1986	3	26.36		6.8	17.94
7/7/1986	5	26.42		6.6	17.9
7/7/1986	7	25.7		4.2	18.1
7/7/1986	9	25.4		3.6	18.5
7/7/1986	11	25.3		3.4	18.7
7/7/1986	13	25.2		3.8	19.1
7/7/1986	15	25.1		3.7	19.6
7/7/1986	17	24.9		3.6	20.1
7/7/1986	19	24.9		3.5	20.4
7/7/1986	19.99	24.9	7.58	3.5	20.4
7/21/1986	1	28.54	7.97	5.2	
7/21/1986	3	28.55		5.2	18.43
7/21/1986	5	28.45		5.1	18.47
7/21/1986	7	28.48		4.8	18.48
7/21/1986	9	28.55		4.8	18.47
7/21/1986	11	28.47		4.6	18.55
7/21/1986	13	28.31		4.3	18.67
7/21/1986	15	28.27		3.8	18.66
7/21/1986	17	27.9		3.3	18.76
7/21/1986	19	27.68		1.9	19.13
7/21/1986	19.99	27.62	7.11	1.8	19.1
8/5/1986	1	28.48	7.23	6.4	19.24
8/5/1986	3	28.5		6.3	19.26
8/5/1986	5	28.49		5.5	19.26
8/5/1986	7	28.35		2.9	19.65
8/5/1986	9	28.08		1.8	19.96
8/5/1986	11	27.53		0.2	21.24
8/5/1986	13	27.12		0.2	21.74
8/5/1986	15	27.06		0.2	21.87
8/5/1986	17	29.05		0.3	21.93
8/5/1986	19	26.94		0.2	22.04
8/5/1986	20.99	26.92		0.2	21.98
8/5/1986	21.99	26.92	7.85	0.2	22.03
8/19/1986	1	27.18	7.81	5.2	19.72
8/19/1986	3	27.1		4.9	20.1
8/19/1986	5	27.08		4.2	20.08
8/19/1986	7	27.26		4.8	20.2
8/19/1986	9	27.24		4.8	20.16
8/19/1986	11	27.36		4.8	20.3
8/19/1986	13	27.26		4.7	20.22
8/19/1986	15	27.28		4.6	20.3
8/19/1986	17	27.38		4.5	20.32
8/19/1986	19	27.32		4.3	20.38
8/19/1986	20.99	27.24	7.47	4	20.42
9/10/1986	1	23.52		6	19.61
9/10/1986	3	23.56		6	19.64
9/10/1986	5	23.53		6	19.61
9/10/1986	7	23.54		5.9	19.63
9/10/1986	9	23.64		5.7	19.76
9/10/1986	11	23.8		5.5	19.92
9/10/1986	13	23.82		5.6	19.92
9/10/1986	15	23.8		5.6	19.98
9/10/1986	17	23.78		5.6	19.92
9/10/1986	19	23.76		5.6	19.96
9/10/1986	20.99	23.8		5.5	19.92
9/10/1986	22.99	23.8		5.5	19.96
9/22/1986	1	22.9	7.41	6.8	20.25
9/22/1986	3	23.1		6.8	20.21
9/22/1986	5	22.84		5.9	20.39
9/22/1986	7	22.7		5.5	20.47
9/22/1986	9	22.62		5.6	20.46
9/22/1986	11	22.55		5.4	20.6
9/22/1986	13	22.44		5.4	20.58
9/22/1986	15	22.55		5.3	20.64
9/22/1986	17	22.48		5.2	20.7
9/22/1986	19	22.5		5.2	20.68
9/22/1986	20.99	22.5		5.2	20.67
9/22/1986	22.99	22.4	7.47	5.2	20.66
10/6/1986	1	24.23	7.73	5.9	20.56
10/6/1986	3	24.35		5.8	20.57
10/6/1986	5	24.25		5.8	20.5
10/6/1986	7	24.31		5.7	20.6
10/6/1986	9	24.27		5.7	20.55
10/6/1986	11	24.29		5.7	20.61
10/6/1986	13	24.6		4.9	21.35
10/6/1986	15	24.35		4.3	21.79
10/6/1986	17	24.26		4.1	22
10/6/1986	19	24.28		3.8	22.19
10/6/1986	19.99	24.2	7.46	3.8	22.12
10/27/1986	1	17.57		9.4	20.49
10/27/1986	3	17.4		9.1	20.54
10/27/1986	5	17.5		8.9	20.39
10/27/1986	7	17.35		8.7	20.64
10/27/1986	9	17.3		8.7	20.62
10/27/1986	11	17.34		8.6	20.66
10/27/1986	13	17.35		8.6	20.6
10/27/1986	15	17.26		8.6	20.64
10/27/1986	17	17.17		8.4	20.48
10/27/1986	19	17.32		8.3	20.68
10/27/1986	19.99	17.35		8.4	20.61
11/24/1986	1	10.7	7.61	9	20.38
11/24/1986	3	10.57		8.8	20.59
11/24/1986	5	10.78		8.6	21.24
11/24/1986	7	10.84		8.5	21.08
11/24/1986	9	10.79		8.5	21.43
11/24/1986	11	10.76		8.5	21.63
11/24/1986	13	10.78		8.5	21.01
11/24/1986	15	10.77		8.6	21.42
11/24/1986	17	10.63		8.5	21.55
11/24/1986	19	10.72		8.5	21.56
11/24/1986	19.99	10.8	7.79	8.9	14.98
12/15/1986	1	7.04	7.96	12	19.77
12/15/1986	3	7.06		12	19.58
12/15/1986	5	7.11		12	19.63
12/15/1986	7	7.34		11.9	19.61
12/15/1986	9	7.58		11.9	19.78
12/15/1986	11	7.76		11.7	20.01
12/15/1986	13	7.8		11.6	20.1
12/15/1986	15	7.91		11.6	20.99
12/15/1986	17	7.88		11.6	20.04
12/15/1986	19	7.89		11.5	20.04
12/15/1986	20.99	7.91		11.5	20
12/15/1986	21.99	8	8.08	11.5	20
1/5/1987	1	4.7		10.6	
1/5/1987	3	4.7		10.5	
1/5/1987	5	4.9		10.4	
1/5/1987	7	5.2		10.2	
1/5/1987	9	5.5		10.2	
1/5/1987	11	5.5		10.1	
1/5/1987	13	5.6		10.1	
1/5/1987	15	5.6		10	
1/5/1987	17	5.6		9.9	
1/5/1987	19	5.7		9.9	
3/3/1987	0.3	6	7.97		
3/3/1987	1	6	7.97	12.7	15.1
3/3/1987	9	5		12.4	15.9
3/3/1987	18	6	8.19	11.2	27
3/17/1987	1	5	8.57		13.9
3/17/1987	7	5			19.3
3/17/1987	14	5	8.01		24
3/31/1987	0.3	11	8.48		
3/31/1987	1	11	8.48	12.6	15
3/31/1987	3	11		12.6	15
3/31/1987	5	11		12.9	15.5
3/31/1987	7	10.5		12.9	15.5
3/31/1987	9	11		13	15.5
3/31/1987	10	10.7	8.62	13	15.5
4/15/1987	1	12.9	9.62	11.2	15
4/15/1987	3	12.9		11.2	15.1
4/15/1987	5	12.1		11.2	15.5
4/15/1987	7	11.5		10.6	16
4/15/1987	9	11		10.5	16.1
4/15/1987	11	10.5	9.37	9.8	16.9
4/30/1987	1	13.73		9.3	12.34
4/30/1987	3	13.73		9.2	12.3
4/30/1987	5	13.7		9.2	12.34
4/30/1987	7	13.74		9	12.52
4/30/1987	9	13.66		8.8	12.72
4/30/1987	11	13.26		8.7	13.2
4/30/1987	13	13.1		8.6	13.86
4/30/1987	15	12.91			14.23
4/30/1987	17	12.78			14.63
4/30/1987	18	12.74	8.94		14.73
5/14/1987	1	17.9	8.75	9.5	11.82
5/14/1987	3	17.76		9.3	11.82
5/14/1987	5	17.76		9.3	11.86
5/14/1987	7	16.46		6.8	13.36
5/14/1987	9	14.5		4.4	15.38
5/14/1987	10	14.24	7.82	3.8	16.06
6/2/1987	0.61	19.3	8.34		
6/2/1987	1	23.64	8.34	8.2	12.61
6/2/1987	3	23.29		7.7	12.8
6/2/1987	5	20.13		6.3	16.11
6/2/1987	7	19.62		5.9	16.65
6/2/1987	9	19.34		5.5	17.29
6/2/1987	11	19.13		5.6	17.56
6/2/1987	13	19.06		5.4	17.69
6/2/1987	15	18.87		5.4	17.88
6/2/1987	17	18.87		5	18.96
6/2/1987	19	18.77		5	18.06
6/2/1987	20.99	18.78		4.9	18.11
6/2/1987	21.99	18.83	8.27	4.9	18.04
6/16/1987	1	25.23	7.89	8.1	14.47
6/16/1987	3	24.67		7	14.84
6/16/1987	5	24.5		6.2	15.24
6/16/1987	7	23.88		2.4	16.04
6/16/1987	9	23.14		1.8	17.13
6/16/1987	11	23.17	7.57	1.8	17.2
6/30/1987	1	25.98	7.83	7.5	15.59
6/30/1987	3	25.98		7.1	15.67
6/30/1987	5	25.97		6.5	15.79
6/30/1987	7	25.48		2.7	16.89
6/30/1987	9	25.07		1.6	17.79
6/30/1987	11	24.98		1.1	18.08
6/30/1987	13	24.88		1	18.2
6/30/1987	15	24.77		0.8	18.38
6/30/1987	17	24.78		0.7	18.41
6/30/1987	19	24.82	7.21	0.7	18.45
7/14/1987	1	28.88	7.9	7	16.77
7/14/1987	3	28.97		6.7	16.75
7/14/1987	5	28.77		6.3	17.02
7/14/1987	7	28.46		4.1	17.38
7/14/1987	9	27.88		2.5	17.7
7/14/1987	11	27.61		2.4	17.84
7/14/1987	13	27.55		2.2	17.82
7/14/1987	14	27.56	7.28	2.4	17.91
8/10/1987	0.61	28.5	7.35		
8/10/1987	1	28.62	7.35	7.2	18.18
8/10/1987	3	28.66		6.8	18.12
8/10/1987	5	28.6		7	18.16
8/10/1987	7	28.6		6.7	18.1
8/10/1987	9	28.57		6.7	18.14
8/10/1987	11	28.64		6.5	18.18
8/10/1987	13	28.67		6.3	18.3
8/10/1987	15	28.62		5	18.54
8/10/1987	17	28.56		3.4	18.92
8/10/1987	19	28.54	7.48	3.8	18.9
8/24/1987	1	27.18	7.92	6.8	18.66
8/24/1987	3	27.16		6.8	18.68
8/24/1987	5	27.2		6.9	18.7
8/24/1987	7	27.14		6.9	18.62
8/24/1987	9	27.04		6.9	18.72
8/24/1987	10	27.13	7.66	6.7	18.71
9/8/1987	0.61	25	7.69		
9/8/1987	1	25.03	7.69	5.6	18.89
9/8/1987	3	25.06		5.6	18.92
9/8/1987	5	25		5.5	18.92
9/8/1987	7	25.1		5.3	18.95
9/8/1987	9	25.05		5.3	18.9
9/8/1987	11	25.1	7.46	5.2	19.2
9/23/1987	1	23.74	7.25	6.7	16.68
9/23/1987	3	23.8		6.6	16.82
9/23/1987	5	24.32		5.8	17.48
9/23/1987	7	25.16		2.1	20.35
9/23/1987	9	25.27		1.5	20.38
9/23/1987	10	25.34	7.05	1.4	20.43
10/7/1987	0.61	18.8			
10/7/1987	1	18.7		8.9	18.32
10/7/1987	3	18.78		8.9	18.33
10/7/1987	5	18.82		8.7	18.46
10/7/1987	7	18.92		8.6	18.78
10/7/1987	9	18.94		8.6	18.91
10/7/1987	11	18.91	8.05	8.2	19.33
10/26/1987	1	14.9		7.7	18.64
10/26/1987	3	14.85		7.7	18.61
10/26/1987	5	14.84		7.6	18.7
10/26/1987	7	14.79		7.6	18.68
10/26/1987	9	14.77		7.6	18.8
10/26/1987	10	14.84	7.63	7.5	18.79
11/5/1987	0.61	14.9	7.48		
11/5/1987	1	14.88	7.48	9.4	18.6
11/5/1987	3	14.79		9.4	18.68
11/5/1987	5	14.91		9.3	18.69
11/5/1987	7	14.64		8.9	19.01
11/5/1987	9	14.58		8.6	19.26
11/5/1987	11	14.56		8.6	19.46
11/5/1987	13	14.49		8.2	19.5
11/5/1987	15	14.64		8.2	19.59
11/5/1987	17	14.5		8.2	19.53
11/5/1987	19	14.47		8.2	19.54
11/5/1987	20.99	14.41		8.2	19.61
11/5/1987	22.99	14.52	7.51	8.1	19.49
12/8/1987	0.61	7.3	7.5		
1/25/1988	0.61	2.2	8.78		
4/11/1988	0.3	12.9	8.61		
6/30/1988	1	23.6	7.67	9.38	14
6/30/1988	3	23.8		9.39	14
6/30/1988	5	23.8		9.15	14.2
6/30/1988	7	24		8.29	14.7
6/30/1988	9	23.6	7.67	6.32	15.9
7/19/1988	1	27.84	8	6.38	17.4
7/19/1988	3	27.84		6.32	17.4
7/19/1988	5	27.81		6.34	17.4
7/19/1988	7	26.71		2.86	18
7/19/1988	9	26		1.54	18.6
7/19/1988	11	25.76		1.32	18.7
7/19/1988	12	25.63	7.2	1.33	18.7
8/2/1988	1	28.18	8.03	6.33	18.7
8/2/1988	3	28.19		5.37	18.7
8/2/1988	5	28.08		4.34	18.6
8/2/1988	7	27.94		3.36	19
8/2/1988	9	27.69		2.38	19

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Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
8/2/1988	11	27.61		2.04	19		6/11/1990	3	23.08		6.83	12.2		4/1/1991	11	10.83	8.64	11.63	12.6
8/2/1988	13	27.56		1.93	19		6/11/1990	5	23.01		6.63	12.4		4/22/1991	1	13.34	7.74	8.24	12.1
8/2/1988	15	27.48		1.67	19.1		6/11/1990	7	22.55		5.42	12.8		4/22/1991	3	13.34		8.24	12.1
8/2/1988	17	27.28		1.22	19.2		6/11/1990	9	21.4	7.38	3.72	14.4		4/22/1991	5	13.39		8.21	12.2
8/2/1988	19	27.18		1.02	19.2		6/25/1990	1	24.79	7.98	7.07	12.8		4/22/1991	7	13.47		8.14	12.5
8/2/1988	20.99	27.16	7.33	0.92	19.3		6/25/1990	3	24.82		6.97	12.8		4/22/1991	9	13.46		8.17	12.9
8/16/1988	1	28.77	7.76	5.54	19		6/25/1990	5	24.76		7.07	13.2		4/22/1991	11	13.43		8.26	13.1
8/16/1988	3	28.7		5.48	19		6/25/1990	7	24.76		5.75	13.2		4/22/1991	12	13.4	7.86	8.32	13.5
8/16/1988	5	28.75		5.5	19		6/25/1990	9	24.15		5.01	14.8		4/30/1991	1	17.11	8.03	8.3	12.5
8/16/1988	7	28.54		3.34	19.1		6/25/1990	10	23.97	7.92	4.64	15.2		4/30/1991	3	16.97		8.35	12.7
8/16/1988	9	28.1		1.89	20.9		7/9/1990	1	26.62	8.59	6.63	13.9		4/30/1991	5	16.96		8.38	12.8
8/16/1988	10	27.96	7.31	1.4	21.1		7/9/1990	3	26.62		6.56	13.8		4/30/1991	7	15.91		7.63	13
9/13/1988	1	23.53	7.84	6.56	20.2		7/9/1990	5	26.6		5.87	14		4/30/1991	9	15.65	7.82	7.57	13.2
9/13/1988	3	23.52		6.46	20.2		7/9/1990	7	26.39		4	14.1		5/14/1991	1	20.94	7.89	7.66	11.8
9/13/1988	5	23.53		6.27	20.1		7/9/1990	9	26.23		2.92	14.4		5/14/1991	3	20.7		7.36	12.1
9/13/1988	7	23.6		5.8	20.6		7/9/1990	11	25.75		0.69	15.1		5/14/1991	5	20.48		7.16	12.3
9/13/1988	9	23.55		5.16	20.2		7/9/1990	12	25.35	7.09	0.35	15.7		5/14/1991	7	20.35		7.12	12.5
9/13/1988	10	23.56	7.6	5.17	20.1		7/23/1990	1	28.29	8.19	7.62	14.3		5/14/1991	9	19.75	7.67	6.93	13
9/28/1988	1	22.28	7.68	5.88	20.2		7/23/1990	3	28.3		7.54	14.4		6/11/1991	1	24.37	8.14	8.09	13.5
9/28/1988	3	22.3		5.75	20.3		7/23/1990	5	28.31		6.78	14.6		6/11/1991	3	24.36		8.01	13.4
9/28/1988	5	22.3		5.76	20.3		7/23/1990	7	27.68		3.7	15.5		6/11/1991	5	24.36		7.95	13.5
9/28/1988	7	22.29		7.25	20.3		7/23/1990	9	27.52		3.28	15.7		6/11/1991	7	24.34		7.61	13.5
9/28/1988	8	22.26	7.66	7.3	20.3		7/23/1990	10	27.5	7.56	3.31	15.7		6/11/1991	9	23.33		2.54	15.3
10/12/1988	1	18.22	7.82	7.18	21.1		8/6/1990	1	27.29	8.39	7.22	14.1		6/11/1991	11	22.84		1.52	16.3
10/12/1988	3	18.23		7.16	21.2		8/6/1990	3	27.25		7.3	14.1		6/11/1991	13	22.72		0.65	17.4
10/12/1988	5	18.22		7.16	21.1		8/6/1990	5	25.25		7.23	14.1		6/11/1991	15	22.74		1.81	17.5
10/12/1988	7	18.23		7.15	21.2		8/6/1990	7	27.3		3.47	15		6/11/1991	17	22.8		2.3	18.1
10/12/1988	9	18.23		7.16	21.2		8/6/1990	9	27.07		0.38	16.9		6/11/1991	19	22.78	7.41	2.74	18.8
10/12/1988	11	18.22	7.78	7.16	22.1		8/6/1990	10	26.89	7.29	0.35	18		6/25/1991	1	24.72		7.38	15.2
10/27/1988	1	14.17	7.84	7.88	22.8		8/21/1990	1	27.23	7.89	5.06	15		6/25/1991	3	24.84		6.75	15.3
10/27/1988	3	14.16		7.91	22.8		8/21/1990	3	27.26		5.05	15.1		6/25/1991	5	24.88		6.18	15.5
10/27/1988	5	14.18		7.91	22.8		8/21/1990	5	27.26		4.97	15.1		6/25/1991	7	24.89		5.87	15.5
10/27/1988	7	14.46		7.81	23		8/21/1990	7	27.27		4.71	15.1		6/25/1991	9	24.87		4.37	15.8
10/27/1988	9	14.56		7.54	23.5		8/21/1990	9	27.26		4.5	15.2		6/25/1991	11	24.87	7.31	2.53	16.5
10/27/1988	10	14.53	7.77	7.47	23.5		8/21/1990	11	27.24	8.15	4.46	15.2		7/11/1991	1	27.75	7.74	6.99	15.2
11/15/1988	1	12.09	7.98	9.38	20.3		9/5/1990	1	26.47	7.75	5.87	14.7		7/11/1991	3	27.81		6.98	15.3
11/15/1988	3	12.11		9.31	20.4		9/5/1990	3	26.45		5.86	14.7		7/11/1991	5	27.89		6.23	15.7
11/15/1988	5	12.25		8.99	20.6		9/5/1990	5	26.52		5.91	14.7		7/11/1991	7	27.55		4.37	16
11/15/1988	7	12.5		8.56	21.1		9/5/1990	7	26.41		5.93	14.7		7/11/1991	9	26.71		2.11	17.2
11/15/1988	9	12.54		8.23	21.4		9/5/1990	9	26.37		5.74	14.7		7/11/1991	10	26.58	6.98	1.94	17.3
11/15/1988	10	12.5	7.88	8.3	21.5		9/5/1990	11	26.38		5.11	14.9		7/25/1991	1	29.29	8.03	6.94	17.9
12/14/1988	1	5.22	7.76	10.48	21.7		9/5/1990	12	26.3	7.52	4.37	15.1		7/25/1991	3	29.25		6.85	18
12/14/1988	3	5.55		10.34	22		9/20/1990	1	22.89	7.79	6.3	13.6		7/25/1991	5	28.27		6.51	18.3
12/14/1988	5	5.78		10.26	22.1		9/20/1990	3	22.89		6.35	13.6		7/25/1991	7	28.21		1.68	20.7
12/14/1988	7	5.76		10.16	22.2		9/20/1990	5	22.91		6.34	13.6		7/25/1991	9	27.55		0.49	21.8
12/14/1988	9	5.77		10.66	22.3		9/20/1990	7	22.92		6.37	13.6		7/25/1991	11	27.31		0.41	22.4
12/14/1988	11	6.05		10.54	22.6		9/20/1990	9	22.98		6.31	13.7		7/25/1991	13	27.28		0.46	22.6
1/18/1989	1	5.1	7.92	10.77	23.1		9/20/1990	10	22.99	7.83	6.32	13.8		7/25/1991	15	27.28	7.24	0.58	22.6
1/18/1989	3	5.15		10.73	23.3		10/4/1990	1	21.09	8.01	7.49	16.4		8/8/1991	1	27.26	7.71	5.7	17.1
1/18/1989	5	5.22		10.6	23.4		10/4/1990	3	21.1		7.45	16.3		8/8/1991	3	27.31		5.62	17.1
1/18/1989	7	5.24		10.42	23.5		10/4/1990	5	21.25		6.85	16.7		8/8/1991	5	27.37		5.17	17.3
1/18/1989	9	5.31		10.26	24.1		10/4/1990	7	21.25		6.64	16.8		8/8/1991	7	27.4		3.97	17.7
1/18/1989	11	5.27	7.87		24.3		10/4/1990	9	21.4		4.96	16.9		8/8/1991	9	27.39		3.78	17.7
2/7/1989	1						10/4/1990	10	21.38	7.7	5.15	17.5		8/8/1991	10	27.32	7.45	3.16	17.9
2/7/1989	26.99						10/22/1990	1	19.57	7.75	7.05	16.2		8/22/1991	1	26.66		5.97	17.5
4/12/1989	1	10.88	7.81	9.63	16.3		10/22/1990	3	19.83		7.01	16.4		8/22/1991	3	26.64		5.91	17.5
4/12/1989	3	10.89		9.57	16.3		10/22/1990	5	20.27		6.92	16.9		8/22/1991	5	26.64		5.75	17.5
4/12/1989	5	11		9.28	16.7		10/22/1990	7	20.21		6.94	16.9		8/22/1991	7	26.7		4.09	18.1
4/12/1989	7	10.67		9.02	17.7		10/22/1990	9	20.3		6.64	17.2		8/22/1991	9	26.7	7.46	3.17	19.1
4/12/1989	9	10.53	7.7	8.86	18.1		10/22/1990	10	20.3	7.73	6.57	17.4		9/10/1991	1	25.36	7.68	6.18	19.2
2/12/1990	1	7.4	8.08	7.9	13.7		11/6/1990	1	16.09	7.97	8.35	15.8		9/10/1991	3	25.41		6.11	19.3
2/12/1990	3	7.41		7.89	13.9		11/6/1990	3	16.09		8.4	15.8		9/10/1991	5	25.52		5.5	19.6
2/12/1990	5	7.39		7.85	14		11/6/1990	5	16.09		8.43	15.8		9/10/1991	7	25.5		5.16	19.7
2/12/1990	7	7.38		7.73	14.2		11/6/1990	7	16.08		8.53	15.9		9/10/1991	9	25.48		5.26	19.9
2/12/1990	9	7.25		7.66	14.7		11/6/1990	9	16.1		8.52	16.1		9/10/1991	11	25.41	7.6	5.12	20.3
2/12/1990	10	7.15	7.94	7.86	14.8		11/6/1990	11	15.96	7.96	8.54	16.2		9/24/1991	1	23.11	7.64	6.49	19.2
3/12/1990	1	9.36	8.4	13.66	12.9		12/11/1990	1	8.45	8.02	10.99	14.8		9/24/1991	3	23.12		6.5	19.2
3/12/1990	3	9.09		13.47	13.2		12/11/1990	3	8.43		10.95	14.8		9/24/1991	5	23.4		6.02	19.4
3/12/1990	5	7.85		11.53	13.8		12/11/1990	5	8.37		10.94	14.8		9/24/1991	7	23.51		5.35	19.7
3/12/1990	7	7.84		11.47	13.7		12/11/1990	7	8.51		10.83	15		9/24/1991	9	23.52	7.52	5.26	20.1
3/12/1990	9	7.7	7.63	11.35	13.9		12/11/1990	9	9.07	7.93	10.28	16.1		10/8/1991	1	20.53	7.77	7.59	19.5
3/27/1990	1	10.29	8.76	12.15	12.8		1/2/1991	1	8.21	8.09	11.99	13.9		10/8/1991	3	20.53		7.6	19.5
3/27/1990	3	10.32		12.03	12.9		1/2/1991	3	8.27		12.28	14		10/8/1991	5	20.48		7.63	19.5
3/27/1990	5	10.39		12.08	12.9		1/2/1991	5	8.29		12.12	14.1		10/8/1991	7	20.49		7.68	19.5
3/27/1990	7	10.44		11.99	13		1/2/1991	7	8.29		12.26	14.1		10/8/1991	9	20.46		7.77	19.5
3/27/1990	8	10.51	8.69	11.44	13.5		1/2/1991	9	8.31		12.44	14.2		10/8/1991	10	20.45	7.71	7.88	19.5
4/9/1990	1	10.09	8.53	11.9	11.4		1/2/1991	11	8.31		12.28	14.3		10/23/1991	1	16.53	7.8	9.06	19.4
4/9/1990	3	10.56		12.09	12.3		1/2/1991	13	8.3		12.28	14.4		10/23/1991	3	16.68		8.97	19.5
4/9/1990	5	10.66		12.1	12.7		1/2/1991	14	8.29	6.71	12.51	14.5		10/23/1991	5	16.75		8.27	19.8
4/9/1990	7	10.62		11.78	13.2		2/21/1991	1	6	8.26	12.61	12.4		10/23/1991	7	16.81		7.8	20
4/9/1990	9	10.44		11.12	14.2		2/21/1991	3	6.41		12.33	12.9		10/23/1991	9	16.82		7.84	20.1
4/9/1990	11	10.29		10.63	14.6		2/21/1991	5	6.09		12.12	13.1		10/23/1991	10	16.84	7.72	7.88	20.2
4/9/1990	13	10.22	8.47	10.71	14.8		2/21/1991	7	5.53		11.85	13.5		11/7/1991	1	13.43	7.67	7.8	19.2
4/24/1990	1	15	8.58	11.45	11		2/21/1991	9	5.36	8.1	11.9	13.6		11/7/1991	3	13.41		7.82	19.3
4/24/1990	3	14.25		12.12	12		3/12/1991	1	7.44	8.5	11.31	12.5		11/7/1991	5	13.39		7.93	19.2
4/24/1990	5	13.78		11.18	12.9		3/12/1991	3	7.43		11.32	12.5		11/7/1991	7	13.4		7.87	19.3
4/24/1990	7	13.31		10.54	13.5		3/12/1991	5	7.43		11.37	12.5		11/7/1991	9	13.38		7.87	19.3
4/24/1990	9	13.21		10.02	13.7		3/12/1991	7	7.69		11.58	12.7		11/7/1991	11	13.34	7.71	8.42	19.3
4/24/1990	10	12.79	8.53	9.61	14.3		3/12/1991	9	7.75		11.41	13.2		12/9/1991	1	9.9	7.94	8.39	20
5/8/1990	1	17.81	8.06	7.93	12		3/12/1991	10	7.73	8.4	11.6	13.2		12/9/1991	3	9.9		8.35	20
5/8/1990	3	17.82		7.87	12.1		3/21/1991	1	8.73	8.45	11.85	12.5		12/9/1991	5	9.9		8.39	20
5/8/1990	5	17.86		7.77	12.2		3/21/1991	3	8.65		11.7	12.5		12/9/1991	7	9.84		8.34	20.6
5/8/1990	7	17.78		6.99	12.7		3/21/1991	5	8.43		11.59	12.7		12/9/1991	9	9.9		8.44	20.3
5/8/1990	8	17.16	8.24	5.72	14.2		3/21/1991	7	8.4		11.64	12.9		12/9/1991	10	9.86	7.92	8.35	20.3
5/24/1990	1	18.96	7.62	6.35	13		3/21/1991	9	8.12		11.43	13.1		1/7/1992	1	6.63	7.99	10.41	18.9
5/24/1990	3	19.11		6.15	13.3		3/21/1991	10	8.12	8.16	11.58	13.1		1/7/1992	3	6.63		10.44	18.8
5/24/1990	5	19.2		5.87	13.6		4/1/1991	1	11.13	8.8	11.87	11.6		1/7/1992	5	6.63		10.4	18.9
5/24/1990	7	19.2		5.44	13.9		4/1/1991	3	11.12		11.84	11.6		1/7/1992	7	6.62		10.46	19
5/24/1990	9	19.2		4.51	15		4/1/1991	5	11.22		11.75	11.8		1/7/1992	9	6.73		10.45	19.4
5/24/1990	10	19.17		4.06	15		4/1/1991	7	11.26		11.41	12.1		1/7/1992	11	6.73	7.99	10.49	19.4
6/11/1990	1	23.21	7.03	7.05	11.7		4/1/1991	9	10.91		11.47	12.5		2/4/1992	1	3.77	8.06	11.23	19

Continued on next page . . .

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
2/4/1992	3	3.91		11.16	19.2	1013	3/29/1993	3	8.52		12.77	8.4	1114	2/8/1994	5	1.78		12.99	15.2
2/4/1992	5	3.99		11.12	19.5	1014	3/29/1993	5	7.28		11.73	11.8	1115	2/8/1994	7	1.59		12.91	16.1
2/4/1992	7	3.96		11.18	19.7	1015	3/29/1993	7	5.77		10.66	14	1116	2/8/1994	8	1.61		13.01	16.1
2/4/1992	8	3.96	8.03	11.29	19.7	1016	3/29/1993	9	5.74	7.88	10.92	14.1	1117	3/15/1994	1	7.19	8.17	13.18	9
3/5/1992	1	8.26	8.14	10.9	17.8	1017	4/12/1993	1	10.46	8.41	11.64	9.4	1118	3/15/1994	3	6.97		12.75	9.8
3/5/1992	3	8.25		10.91	18.4	1018	4/12/1993	3	10.38		11.3	9.3	1119	3/15/1994	5	6.73		12.58	11.1
3/5/1992	5	8.07		10.84	18.6	1019	4/12/1993	5	10.96		10.38	9.8	1120	3/15/1994	7	5.6		11.54	13.4
3/5/1992	7	7.95		10.63	18.6	1020	4/12/1993	7	11.23		10.4	10.1	1121	3/15/1994	9	5.47		11.5	13.8
3/5/1992	9	6.87		10.26	20.2	1021	4/12/1993	9	10		11.08	10.6	1122	3/15/1994	11	5.32	7.81	11.62	14.4
3/5/1992	11	6.75		10.27	20.6	1022	4/12/1993	10	9.81	8.25	10.91	11	1123	4/12/1994	1	12.93	7.99	10.19	8.5
3/5/1992	13	6.72		10.29	20.8	1023	4/20/1993	1	13.94	8.78	11.08	8.2	1124	4/12/1994	3	12.94		10.19	8.5
3/5/1992	15	6.7		10.34	20.8	1024	4/20/1993	3	13.94		11.08	8.2	1125	4/12/1994	5	12.98		10.02	8.6
3/5/1992	17	6.72		10.43	20.9	1025	4/20/1993	5	13.92		11.05	8.3	1126	4/12/1994	7	12.67		9.46	9.1
3/5/1992	18	6.74	7.97	10.68	20.8	1026	4/20/1993	7	12.16		10.33	10.6	1127	4/12/1994	9	12.31		9.58	9.5
4/16/1992	1	12.15	8.18	10.26	17	1027	4/20/1993	9	11.65		9.85	11.3	1128	4/12/1994	10	12.08	7.89	9.67	9.9
4/16/1992	3	12.15		10.26	17	1028	4/20/1993	11	10.42		8.33	12.9	1129	5/10/1994	1	17.23	8.39	9.67	8.1
4/16/1992	5	12.15		10.3	17	1029	4/20/1993	13	10.34	8.07	8.21	13	1130	5/10/1994	3	17.29		9.57	8.2
4/16/1992	7	12.15		10.29	17.1	1030	5/5/1993	0.3	17	8.65			1131	5/10/1994	5	17.22		8.98	8.3
4/16/1992	9	12.14		10.38	17.1	1031	5/5/1993	1	17.05	8.65	10.68	9	1132	5/10/1994	7	17.05		8.32	8.9
4/16/1992	10	12.09	8.15	10.57	17.1	1032	5/5/1993	3	16.89		10.67	9.1	1133	5/10/1994	9	16.67		7.63	9.3
5/11/1992	0.3	15.6	8.14	9.2		1033	5/5/1993	5	16.88		10.66	9.1	1134	5/10/1994	11	17.33		7.26	10
5/11/1992	1	15.62	8.14	9.22	15.2	1034	5/5/1993	7	16.12		9.76	9.6	1135	5/10/1994	12	16.28	7.75	7.09	10.4
5/11/1992	3	15.65		9.17	15.2	1035	5/5/1993	9	14.94		8.08	9.9	1136	6/7/1994	1	22.04	7.94	9.24	9.9
5/11/1992	5	15.6		9.06	15.4	1036	5/5/1993	11	14.46		7.24	10.2	1137	6/7/1994	3	21.98		9.13	9.9
5/11/1992	7	15.52		8.98	15.5	1037	5/5/1993	13	13.88		6.18	10.3	1138	6/7/1994	5	21.91		8.99	9.9
5/11/1992	9	15.41		10.1	15.5	1038	5/5/1993	15	13.79		6.02	10.6	1139	6/7/1994	7	21.17		4.74	10.7
5/11/1992	11	15.02		10.23	16.4	1039	5/5/1993	17	13.69		6.02	10.3	1140	6/7/1994	9	19.45		4.28	11.8
5/18/1992	1	18.36	8.02	8.13	15.7	1040	5/5/1993	19	13.66		5.88	10.5	1141	6/7/1994	11	19.02		3.93	12.4
5/18/1992	3	18.33		8.07	15.8	1041	5/5/1993	19.99	13.66	7.73	5.91	10.4	1142	6/7/1994	13	18.92	7.9	3.79	12.4
5/18/1992	5	18.14		7.88	16	1042	5/20/1993	1	20.15	7.9	6.54	8	1143	7/5/1994	1	27.1	8.16	7.06	13.1
5/18/1992	7	18.02		7.84	16.1	1043	5/20/1993	3	20.14		6.49	8	1144	7/5/1994	3	26.94		6.8	13.2
5/18/1992	9	17.88		7.81	16.2	1044	5/20/1993	5	20.09		6.69	8.1	1145	7/5/1994	5	26.53		4.23	13.8
5/18/1992	10	17.77	7.94	7.82	16.2	1045	5/20/1993	7	19.98		5.74	8.3	1146	7/5/1994	7	25.73		1.57	14.3
6/2/1992	1	19.55	8.08	12.15	14.7	1046	5/20/1993	9	19.4		4.08	9.2	1147	7/5/1994	9	24.64		0.25	15.8
6/2/1992	3	19.49		9.77	14.7	1047	5/20/1993	11	17.3		1.34	11.6	1148	7/5/1994	11	24.51	7.1	0.32	16
6/2/1992	5	19.48		9.71	14.8	1048	5/20/1993	13	16.54		0.86	12.3	1149	8/9/1994	1	25.38	8.05	7.07	12.6
6/2/1992	7	19.5		10.35	15	1049	5/20/1993	15	16.29		0.87	13.2	1150	8/9/1994	3	25.38		7.06	12.6
6/2/1992	9	18.87		8.41	17.2	1050	5/20/1993	17	16.27		1.16	13.9	1151	8/9/1994	5	26.19		6.99	13.2
6/2/1992	10	18.73	7.99	9.24	18.1	1051	5/20/1993	19	16.2	7.43	1.14	13.8	1152	8/9/1994	7	26.33		4.52	13.8
6/16/1992	1	23.91	8.15	8.23	13.7	1052	6/3/1993	1	21	7.9	7.64	9.6	1153	8/9/1994	9	26.36		3.17	14.3
6/16/1992	3	23.75		8.07	13.8	1053	6/3/1993	3	20.99		7.22	9.8	1154	8/9/1994	11	26.29	7.59	2.52	14.5
6/16/1992	5	22.64		6.36	14.4	1054	6/3/1993	5	21.04		7.23	10	1155	9/6/1994	5	23.63		6.51	13.7
6/16/1992	7	21.62		3.53	15.3	1055	6/3/1993	7	20.74		6.02	10.3	1156	9/6/1994	7	23.88		6.12	13.9
6/16/1992	9	21.29		3.54	16.2	1056	6/3/1993	9	19.74		2.92	12.1	1157	9/6/1994	9	24.19		5.45	14.3
6/16/1992	11	21.22	7.75	3.74	16.6	1057	6/3/1993	10	19.14	7.42	2.42	13.6	1158	10/5/1994	12	20.9	7.8	6.09	16.2
6/30/1992	1	23.84		7.76	16	1058	6/21/1993	1	26.02	8.13	7.55	10.2	1159	10/5/1994	1	19.88	7.86	6.94	15.4
6/30/1992	3	23.84		7.71	16	1059	6/21/1993	3	25.95		7.35	10.2	1160	10/5/1994	3	20.01		6.87	15.4
6/30/1992	5	23.86		7.69	16.1	1060	6/21/1993	5	25.57		6.24	10.7	1161	10/5/1994	5	20.07		6.84	15.4
6/30/1992	7	23.1		5.3	16.9	1061	6/21/1993	7	23.94		3.72	12.5	1162	10/5/1994	7	20.27		6.61	15.5
6/30/1992	9	22.04		3.18	17.8	1062	6/21/1993	9	23.15		2.26	14	1163	10/5/1994	9	20.66		6.27	16
6/30/1992	11	21.53	7.4	2.27	18.6	1063	6/21/1993	11	22.96	7.44	1.9	15	1164	10/5/1994	11	20.03		6.12	16.2
8/27/1992	1	26.29	8.08	7.56	16.3	1064	7/6/1993	1	28.03	8.23	10.01	12.6	1165	11/15/1994	13	14.07	7.78	8.13	18.5
8/27/1992	3	26.35		7.34	14.9	1065	7/6/1993	3	28.02		9.95	12.6	1166	11/15/1994	1	13.8	7.86	8.9	16.8
8/27/1992	5	26.29		7.19	16.5	1066	7/6/1993	5	26.8		3.97	13.7	1167	11/15/1994	3	14.07		8.73	17
8/27/1992	7	26.02		5.7	16.8	1067	7/6/1993	7	25.98		1.73	14.1	1168	11/15/1994	5	14.33		8.16	17.7
8/27/1992	9	25.85		5.52	17.1	1068	7/6/1993	9	25.89		1.45	14.4	1169	11/15/1994	7	14.15		7.98	18.3
8/27/1992	11	25.83		5.59	17	1069	7/6/1993	11	25.69	7.48	1.04	15	1170	11/15/1994	9	14.09		8	18.5
8/27/1992	13	25.75		5.64	17.2	1070	7/20/1993	1	28.09	8.02	5.76	13.4	1171	11/15/1994	11	14.08		8.04	18.5
8/27/1992	15	25.72		5.57	17.4	1071	7/20/1993	3	28.09		5.74	13.4	1172	12/1/1994	11	11.86	7.77	8.57	20.2
8/27/1992	17	25.64	7.83	5.38	17.3	1072	7/20/1993	5	28.08		5.75	13.4	1173	12/1/1994	1	11.04	7.91	9.72	17.2
9/28/1992	1	22.16	7.77	5.93	16.2	1073	7/20/1993	7	28.06		5.03	13.5	1174	12/1/1994	3	11.19		9.63	17.3
9/28/1992	3	22.11		5.33	16.9	1074	7/20/1993	9	27.64		2.21	14.5	1175	12/1/1994	5	11.55		9.28	18
9/28/1992	5	21.99		4.99	16.9	1075	7/20/1993	11	26.62	7.39	0.21	15.8	1176	12/1/1994	7	11.66		8.84	19.2
9/28/1992	7	21.97		4.84	17.1	1076	8/3/1993	1	27.37	7.99	6.02	15.3	1177	12/1/1994	9	11.84		8.61	19.9
9/28/1992	9	21.95		4.82	17.2	1077	8/3/1993	3	27.37		5.97	15.3	1178	1/10/1995	20.99	6.25	7.74	10.31	19.8
9/28/1992	11	21.95	7.58	4.9	17.1	1078	8/3/1993	5	27.42		5.69	15.4	1179	1/10/1995	1	5.42	7.83	11.45	17.3
10/13/1992	1	18.16	7.82	7.73	16.4	1079	8/3/1993	7	27.3		3.77	16.1	1180	1/10/1995	3	5.42		11.32	17.5
10/13/1992	3	18.16		7.68	15.4	1080	8/3/1993	9	26.92		1.76	17.7	1181	1/10/1995	5	5.9		10.96	18.1
10/13/1992	5	18.25		7.56	16.5	1081	8/3/1993	10	26.83	7.65	1.3	17.7	1182	1/10/1995	7	6.06		10.77	18.6
10/13/1992	7	18.52		7.74	17	1082	8/17/1993	1	27.33	8.19	6.75	15.5	1183	1/10/1995	9	6.05		10.74	18.8
10/13/1992	9	18.65		7.04	18.1	1083	8/17/1993	3	27.32		6.72	15.5	1184	1/10/1995	11	6.07		10.67	18.9
10/13/1992	11	18.68	7.73	6.74	18.7	1084	8/17/1993	5	27.31		6.5	15.5	1185	1/10/1995	13	6.12		10.59	19.1
10/27/1992	1	14.84	7.88	8.56	18.3	1085	8/17/1993	7	26.7		3.15	16.6	1186	1/10/1995	15	6.18		10.49	19.4
10/27/1992	3	14.86		8.41	18.4	1086	9/8/1993	1	27.11		6.77	17.8	1187	1/10/1995	17	6.2		10.4	19.6
10/27/1992	5	14.92		8.35	18.3	1087	9/8/1993	3	27.09		6.87	17.8	1188	1/10/1995	19	6.23		10.37	19.7
10/27/1992	7	15.04		8.26	18.5	1088	9/8/1993	5	27.11		6.86	17.9	1189	2/14/1995	16	2.73	7.81	13	18.5
10/27/1992	9	15.08	7.27	8.24	18.6	1089	9/8/1993	7	27.2		4	18.8	1190	2/14/1995	1	1.79	7.96	13.31	15
11/12/1992	1	12.83	7.83	9.66	16.1	1090	9/8/1993	9	27.09		3.09	19.4	1191	2/14/1995	3	1.95		13.26	15.2
11/12/1992	3	12.94		9.46	16.5	1091	9/8/1993	10	27.01		3.05	19.7	1192	2/14/1995	5	2.42		13.02	16
11/12/1992	5	13.02		9.04	16.8	1092	9/16/1993	1	25.34	7.88	5.76	18.4	1193	2/14/1995	7	2.46		12.71	16.8
11/12/1992	7	13.26		8.65	17.1	1093	9/16/1993	3	25.34		5.75	18.4	1194	2/14/1995	9	2.6		12.24	17.8
11/12/1992	9	13.31		8.33	17.6	1094	9/16/1993	5	25.35		5.61	18.4	1195	2/14/1995	11	2.64		12.11	18.1
11/12/1992	11	13.23		8.3	17.5	1095	9/16/1993	7	25.36		5.48	18.4	1196	2/14/1995	13	2.71		12	18.4
11/12/1992	13	13		8.46	17.8	1096	9/16/1993	9	25.39	7.85	5.66	18.5	1197	2/14/1995	15	2.7		12.32	18.4
11/12/1992	15	12.86		8.55	17.8	1097	10/4/1993	1	20.34	7.87	6.88	18.4	1198	3/14/1995	10	5.3	7.76	11.1	18.6
11/12/1992	17	12.83		8.57	18	1098	10/4/1993	3	20.36		6.9	18.4	1199	3/14/1995	1	7.87	8.28	13.62	15
11/12/1992	19	12.83		8.54	18	1099	10/4/1993	5	20.37		6.85	18.5	1200	3/14/1995	3	7.07		13.26	15.6
11/12/1992	19.99	12.83	7.77	8.66	17.9	1100	10/4/1993	7	20.37		6.83	18.5	1201	3/14/1995	5	6.26		11.72	16.4
12/16/1992	1	5.58	7.82	11.63	14.2	1101	10/4/1993	9	20.44		6.79	18.5	1202	3/14/1995	7	5.8		11.33	17.5
12/16/1992	3	6.35		11.33	15.6	1102	10/4/1993	11	20.65		6.67	19	1203	3/14/1995	9	5.36		11.01	18.2
12/16/1992	5	6.6		11.13	16.8	1103	10/4/1993	13	20.6		6.69	18.9	1204	4/6/1995	11	10.5	8.16	9.39	18.8
12/16/1992	7	6.66		10.51	17.2	1104	10/4/1993	15	20.58		6.75	19	1205	4/6/1995	1	10.87	8.28	9.19	15.6
12/16/1992	9	6.62		10.53	17.5	1105	10/4/1993	16	20.56	7.67	6.8	19	1206	4/6/1995	3	10.85		9.23	15.6
12/16/1992	11	6.6	7.78	10.78	17.4	1106	1/11/1994	1	2.87	8.25	14.87	14.9	1207	4/6/1995	5	10.93		9.27	15.7
2/8/1993	1	3.92	8.34	12.08	13.7	1107	1/11/1994	3	3.28		14.67	15.3	1208	4/6/1995	7	11.09		9.28	16.2
2/8/1993	3	3.94		12.12	13.7	1108	1/11/1994	5	3.19		14.62	15.4	1209	4/6/1995	9	10.63		9.26	17.3
2/8/1993	5	3.91		12.08	13.8	1109	1/11/1994	7	3.16		14.66	15.5	1210	5/16/1995	11	18.24	7.48	7.06	15.9
2/8/1993	7	3.96		11.99	14	1110	1/11/1994	9	3.25		14.72	15.5	1211	5/16/1995	1	18.5	7.58	7.44	15.4
2/8/1993	9	4.17		11.43	14.9	1111	1/11/1994	10	3.24	8.08	14.93	15.6	1212	5/16/1995	3	18.51		7.46	15.4
2/8/1993	11	4.18	8.19	11.46	15	1112	2/8/1994	1	2.45		13.42	12	1213	5/16/1995	5	18.52		7.5	15.4
3/29/1993	1	9	8.6	13.16	7.6	1113	2/8/1994	3	1.97		13.34	13.8	1214	5/16/1995	7	18.48		7.19	15.8

Continued on next page . . .

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
5/16/1995	9	18.28		7.08	15.9
6/8/1995	12	22.32	7.47	5.4	17.4
6/8/1995	1	23.91	7.74	7.57	15.5
6/8/1995	3	23.85		7.34	15.8
6/8/1995	5	23.55		6.95	16.3
6/8/1995	7	23.28		6.63	16.5
6/8/1995	9	22.5		5.45	17.2
6/8/1995	11	22.36		5.36	17.3
7/11/1995	10	25.85	7.28	1.51	17.1
7/11/1995	1	26.78	8.32	8.74	11.4
7/11/1995	3	26.7		6.64	15.1
7/11/1995	5	26.42		2.55	15.7
7/11/1995	7	26.02		1.5	16.3
7/11/1995	9	25.86		1.35	17.1
8/10/1995	19	27.54	7.44	4.19	17.7
8/10/1995	1	27.01	7.56	5.61	16.7
8/10/1995	3	27.04		5.52	16.7
8/10/1995	5	27.05		5.47	16.6
8/10/1995	7	27.1		5.4	16.6
8/10/1995	9	27.52		4.3	16.9
8/10/1995	11	27.85		3.75	17.1
8/10/1995	13	27.62		4.15	17.3
8/10/1995	15	27.57		4.04	17.6
8/10/1995	17	27.55		4.06	17.7
9/7/1995	11	25.77	7.73	2.97	19.6
9/7/1995	1	25.55	8	6.68	17.7
9/7/1995	3	25.66		6.34	17.8
9/7/1995	5	25.86		5.03	18.5
9/7/1995	7	25.83		3.54	19.2
9/7/1995	9	25.8		3.23	19.4
10/13/1995	11	21.94	7.68	4.31	22.7
10/13/1995	1	21.23	8.01	7.99	20.2
10/13/1995	3	21.27		7.96	20.2
10/13/1995	5	21.44		7.83	20.3
10/13/1995	7	21.91		6.11	21.2
10/13/1995	9	22.01		4.47	22.4
11/27/1995	11	8.85	7.94	10.07	19.7
11/27/1995	1	8.51	8.03	10.99	18.2
11/27/1995	3	8.53		10.98	18.2
11/27/1995	5	8.59		10.87	18.3
11/27/1995	7	8.82		10.74	19
11/27/1995	9	8.86		10.25	19.3
12/13/1995	10	6.08	8.16	10.42	18.3
12/13/1995	1	5.32	8.22	10.86	17.8
12/13/1995	3	5.33		10.83	17.8
12/13/1995	5	6.16		10.39	18.2
12/13/1995	7	6.14		10.41	18.2
12/13/1995	9	6.12		10.43	18.3
1/25/1996	19.99	1.81	7.98	12.71	16.9
1/25/1996	1	2.75	8.04	12.42	13
1/25/1996	3	2.83		12.37	14
1/25/1996	5	2.81		12.42	14.4
1/25/1996	7	2.86		12.39	14.6
1/25/1996	9	2.41		12.35	15.8
1/25/1996	11	1.9		12.42	16.8
1/25/1996	13	1.9		12.45	16.7
1/25/1996	15	1.86		12.51	16.8
1/25/1996	17	1.84		12.55	16.9
1/25/1996	19	1.85		12.67	16.9
2/6/1996	11	4	7.55	11.1	12.3
2/6/1996	1	4.66	7.62	11.95	9
2/6/1996	3	4.66		11.98	9.1
2/6/1996	5	4.59		12.04	9.4
2/6/1996	7	4.44		11.94	10.1
2/6/1996	9	4.19		11.68	11
2/22/1996	13	2.07	7.98	13.5	13.2
2/22/1996	1	2.78	8.08	14.15	12.3
2/22/1996	3	2.5		13.76	12.5
2/22/1996	5	2.37		13.58	12.8
2/22/1996	7	2.39		13.52	12.8
2/22/1996	9	2.2		13.47	13
2/22/1996	11	2.11		13.45	13.1
3/14/1996	12	3.47	8.05	12.56	13.5
3/14/1996	1	5.03	8.22	12.64	11.4
3/14/1996	3	4		12.34	12.3
3/14/1996	5	3.86		12.35	12.7
3/14/1996	7	3.7		12.34	13.1
3/14/1996	9	3.56		12.36	13.3
3/14/1996	11	3.5		12.43	13.4
4/11/1996	11	8.92	8.06	10.75	11.1
4/11/1996	1	8.89	8.02	10.69	10.2
4/11/1996	3	8.89		10.69	10.2
4/11/1996	5	8.93		10.7	10.2
4/11/1996	7	9.03		10.77	10.5
4/11/1996	9	9.02		10.81	10.6
5/23/1996	20.99	17.3	7.73	4.89	13
5/23/1996	1	22.42	8.08	8.52	
5/23/1996	3	22.45		8.5	10.8
5/23/1996	5	21.06		7.29	11.2
5/23/1996	7	18.94		5.65	12.1
5/23/1996	9	17.92		5.82	12.7
5/23/1996	11	17.7		5.53	12.8
5/23/1996	13	17.67		5.59	12.8
5/23/1996	15	17.52		5.34	12.8
5/23/1996	17	17.36		4.99	13
5/23/1996	19	17.35		4.95	13
6/6/1996	17	18.92	7.56	5.32	12.2
6/6/1996	1	20.64	7.74	7.5	10.5
6/6/1996	3	20.52		7.28	10.6
6/6/1996	5	20.36		7.11	10.7
6/6/1996	7	20.03		6.16	10.8
6/6/1996	9	19.84		5.8	10.9
6/6/1996	11	19.83		5.95	11.1
6/6/1996	13	19.28		5.61	11.7
6/6/1996	15	19.16		5.47	11.9
7/25/1996	19	25.54	7.53	0.63	13.8
7/25/1996	1	26.15	8.52	10.42	11.6
7/25/1996	3	26.38		8.81	12.1
7/25/1996	5	26.1		6.29	12.4
7/25/1996	7	25.74		2.67	13.1
7/25/1996	9	25.64		1.66	13.4
7/25/1996	11	25.61		1.29	13.6
7/25/1996	13	25.6		1.18	13.6
7/25/1996	15	25.56		0.79	13.7
7/25/1996	17	25.54		0.62	13.8
8/8/1996	11	25.66	7.45	0.38	13.7
8/8/1996	1	26.97	8.11	7.44	11.9
8/8/1996	3	26.97		6.68	11.9
8/8/1996	5	26.47		2.81	12.4
8/8/1996	7	26.15		1.3	12.9
8/8/1996	9	25.92		0.66	13.3
9/19/1996	10	24.09	7.7	4.47	12.7
9/19/1996	1	23.45	7.77	5.86	11.5
9/19/1996	3	23.49		5.81	11.4
9/19/1996	5	23.49		5.8	11.5
9/19/1996	7	23.67		5.47	11.8
9/19/1996	9	23.91		5.19	12.2
10/10/1996	10	18.43	8.07	6.8	12.2
10/10/1996	1	18.13	8.09	7.79	11.6
10/10/1996	3	18.18		7.66	11.6
10/10/1996	5	18.14		7.77	11.6
10/10/1996	7	18.17		7.52	11.5
10/10/1996	9	18.37		6.91	12.2
11/7/1996	11	14.85	7.91	7.7	13.8
11/7/1996	1	14.86	8.03	9.3	11.9
11/7/1996	3	14.89		9.22	12
11/7/1996	5	14.94		8.28	12.4
11/7/1996	7	15.07		7.59	13.3
11/7/1996	9	14.85		7.67	13.7
12/5/1996	12	8.56	7.73	9.93	14.5
12/5/1996	1	7.81	7.74	11.2	11
12/5/1996	3	8.03		11.23	11.2
12/5/1996	5	8.2		11.22	11.4
12/5/1996	7	8.34		11.15	12
12/5/1996	9	8.42		10.82	12.7
12/5/1996	11	8.55		9.9	14.5
1/14/1997	10	5.41	7.6	11.33	11.7
1/14/1997	1	4.53	7.6	11.6	10
1/14/1997	3	4.56		11.62	10
1/14/1997	5	4.61		11.63	10
1/14/1997	7	4.88		11.59	10
1/14/1997	9	5.36		11.36	11.1
3/12/1997	10	8.27	7.75	11.13	11.6
3/12/1997	1	9.3	7.73	11.26	9.4
3/12/1997	3	9.26		11.2	9.5
3/12/1997	5	9.13		11.17	9.6
3/12/1997	7	8.81		11.3	10.3
3/12/1997	9	8.57		11.56	11
4/14/1997	9	11.88	8.2	10	12.2
4/14/1997	1	12.03	8.41	10.78	10.3
4/14/1997	3	12.04		10.72	10.4
4/14/1997	5	12.04		10.57	10.4
4/14/1997	7	12.07		10.43	10.6
5/8/1997	11	14.47	7.65	7.21	13.9
5/8/1997	1	15.15	8.09	9.45	11.4
5/8/1997	3	15.15		9.45	11.4
5/8/1997	5	15.32		9.57	11.6
5/8/1997	7	15.11		8.03	12.5
5/8/1997	9	14.76		7.66	13.3
6/12/1997	16	17.96	7.75	7.12	14.8
6/12/1997	1	20.18	7.89	8.53	11.9
6/12/1997	3	20.1		8.4	12
6/12/1997	5	18.96		7.14	12.8
6/12/1997	7	18.7		7.43	13.4
6/12/1997	9	18.37		7.3	13.8
6/12/1997	11	18.29		7.67	14.1
6/12/1997	13	18.13		7.46	14.4
6/12/1997	15	18.03		7.19	14.6
8/13/1997	11	25.76	7.61	2.62	19.6
8/13/1997	1	26.88	8	6.29	15.9
8/13/1997	3	26.75		6.08	16
8/13/1997	5	26.62		5.75	16
8/13/1997	7	26.42		2.49	17
8/13/1997	9	26.01		3.14	18.4
9/15/1997	11	24.27	7.7	3.89	20.3
9/15/1997	1	24.48	7.99	7.61	17.2
9/15/1997	3	24.56		7.27	17.5
9/15/1997	5	24.68		6.95	18.1
9/15/1997	7	24.43		4.76	19.3
9/15/1997	9	24.32		4.08	20
10/9/1997	12	20.54	7.75	4.29	20.8
10/9/1997	1	21.56	8.11	7.97	18.6
10/9/1997	3	21.57		7.85	18.7
10/9/1997	5	21.37		6.45	18.9
10/9/1997	7	20.7		4.65	19.8
10/9/1997	9	20.6		4.5	20.3
10/9/1997	11	20.54		4.33	20.7
11/12/1997	11	13.25	7.89	8.1	19.7
11/12/1997	1	12.38	7.94	9.2	17.4
11/12/1997	3	12.78		8.99	18.1
11/12/1997	5	12.82		8.8	18.5
11/12/1997	7	13.18		8.27	19.4
11/12/1997	9	13.24		8.12	19.7
12/4/1997	19.99	9	7.88	10.17	18.6
12/4/1997	1	8.62	7.92	10.78	17.1
12/4/1997	3	8.72		10.59	17.4
12/4/1997	5	8.84		10.39	17.8
12/4/1997	7	8.91		10.22	18
12/4/1997	9	8.96		10.2	18.3
12/4/1997	11	8.98		10.19	18.4
12/4/1997	13	8.98		10.17	18.5
12/4/1997	15	8.99		10.16	18.5
12/4/1997	17	8.99		10.16	18.5
12/4/1997	19	8.99		10.17	18.5
1/13/1998	11	7.07	7.86	10.2	19.4
1/13/1998	1	7.5	8.02	11.31	16.4
1/13/1998	3	7.35		11.2	16.9
1/13/1998	5	7.32		10.73	17.7
1/13/1998	7	7.21		10.41	18.6
1/13/1998	9	7.07		10.3	18.8
2/9/1998	11	5.7	7.42	10.44	12.9
2/9/1998	1	4.85	7.61	11.4	6.8
2/9/1998	3	5.51		11.16	9
2/9/1998	5	5.6		10.95	11
2/9/1998	7	5.63		10.48	12.2
2/9/1998	9	5.69		10.36	12.9
3/5/1998	19	7.81	8	11.2	12.7
3/5/1998	1	7.9	8.12	11.76	10.5
3/5/1998	3	7.92		11.76	10.5
3/5/1998	5	8.07		11.72	10.8
3/5/1998	7	8		11.58	11.8
3/5/1998	9	7.97		11.52	11.9
3/5/1998	11	7.96		11.48	12
3/5/1998	13	7.95		11.48	12
3/5/1998	15	7.95		11.47	12
3/5/1998	17	7.94		11.3	12.1
4/15/1998	17	12.2	7.95	8.41	12.5
4/15/1998	1	13.33	8.05	9.06	9.3
4/15/1998	3	13.31		9.03	9.3
4/15/1998	5	13.33		9.01	9.3
4/15/1998	7	13.12		8.4	10
4/15/1998	9	12.56		7.5	10.8
4/15/1998	11	12.46		8.28	11.3
4/15/1998	13	12.37		8.37	11.6
4/15/1998	15	12.34		8.48	11.8
5/7/1998	12	15.46	7.43	3.75	12.5
5/7/1998	1	18.49	8.86	11.4	8.8
5/7/1998	3	18.47		11.52	9.1
5/7/1998	5	17.22		8.18	9.8
5/7/1998	7	16.91		7.35	10.7
5/7/1998	9	15.67		4.36	12
5/7/1998	11	15.54		4.03	12.4
6/11/1998	13	20.69	7.11	2.15	12.4
6/11/1998	1	21.1	7.86	7.7	9.9
6/11/1998	3	21.12		7.48	10
6/11/1998	5	21.13		7.44	10.1
6/11/1998	7	21.17		6.65	10.3
6/11/1998	9	21.26		5.46	10.6
6/11/1998	11	21.15		4.69	11.1
7/9/1998	11	24.57	7.16	0.22	14.7
7/9/1998	1	26.6	8.15	6.37	11.4
7/9/1998	3	26.61		6.32	11.5
7/9/1998	5	26.62		6.25	11.5
7/9/1998	7	26.67		5.74	11.6
7/9/1998	9	25.67		0.94	13.1
8/6/1998	14	26.38	7.45	0.2	16.3
8/6/1998	1	26.33	8.28	7.6	13.2
8/6/1998	3	26.28		7.01	13.4
8/6/1998	5	26.26		6.68	13.5
8/6/1998	7	26.42		5.58	13.7
8/6/1998	9	26.33		2.23	14.9
8/6/1998	11	26.33		0.36	15.6
9/10/1998	11	24.97	7.97	6.12	16.2
9/10/1998	1	24.85	7.99	6.13	16.2
9/10/1998	3	24.86		6.13	16.2
9/10/1998	5	24.86		6.14	16.2
9/10/1998	7	24.92		6.11	16.2
9/10/1998	9	24.87		6.13	16.2
10/8/1998	19	21.59	7.81	6	17.7
10/8/1998	1	21.63	7.8	5.98	17.6
10/8/1998	3	21.63		5.98	17.6
10/8/1998	5	21.64		5.95	17.6
10/8/1998	7	21.65		5.94	17.6
10/8/1998	9	21.64		5.99	17.6
10/8/1998	11	21.61		6	17.6
10/8/1998	13	21.62		5.93	17.7
10/8/1998	15	21.67		5.86	17.7
10/8/1998	17	21.64		5.93	17.7
11/12/1998	13	13.08	8.04	8.03	19.2
11/12/1998	1	13.31	8.13	8.78	18.3
11/12/1998	3	13.29		8.75	18.3
11/12/1998	5	13.3		8.74	18.3
11/12/1998	7	13.3		8.64	18.3
11/12/1998	9	13.18		8.32	18.6
11/12/1998	11	13.07		8.01	19
12/10/1998	13	13.19	7.86	8.58	20
12/10/1998	1	12.76	7.88	8.92	19.1
12/10/1998	3	12.78		8.95	19.2
12/10/1998	5	12.82		8.91	19.2
12/10/1998	7	13.03		8.88	19.4
12/10/1998	9	13.11		8.77	19.7
12/10/1998	11	13.14		8.78	19.8
1/11/1999	16	4.23	7.63	11.03	19.9

Continued on next page . . .

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
1/11/1999	1	3.47	7.78	11.33	18.3	1511	1/13/2000	7	7.56		10.09	18.2	1711	2/8/2001	12	1.98	7.75	13.65	20.5
1/11/1999	3	3.53		11.36	18.8	1512	1/13/2000	9	7.62		10.01	18.6	1712	3/15/2001	1	7.32	7.62	10.7	18.1
1/11/1999	5	3.64		11.39	18.3	1513	1/13/2000	11	7.59		9.9	18.9	1713	3/15/2001	3	7.41		10.72	18.2
1/11/1999	7	3.76		11.32	18.3	1514	1/13/2000	13	7.57		9.87	19	1714	3/15/2001	5	7.4		10.62	18.3
1/11/1999	9	3.87		11.1	19.3	1515	1/13/2000	15	7.56		9.82	19.1	1715	3/15/2001	7	7.03		10.47	18.9
1/11/1999	11	4.16		10.93	19.4	1516	2/10/2000	13	1.95	7.43	12.85	18.8	1716	3/15/2001	9	6.94		10.59	19.1
1/11/1999	13	4.17		10.93	19.6	1517	2/10/2000	1	2.17	7.62	13.34	18.4	1717	3/15/2001	11	6.83	7.55	10.45	19.2
1/11/1999	15	4.2		10.95	19.5	1518	2/10/2000	3	2.08		13.01	18.5	1718	4/12/2001	1	12.81	7.78	9.04	15.7
2/11/1999	18	6.52	7.2	9.77	19.5	1519	2/10/2000	5	2.05		12.78	18.7	1719	4/12/2001	3	12.51		8.88	16.1
2/11/1999	1	7.29	7.3	9.97	17.3	1520	2/10/2000	7	2		12.42	18.7	1720	4/12/2001	5	12.35		8.89	16.3
2/11/1999	3	7.11		9.81	17.7	1521	2/10/2000	9	1.95		12.34	18.8	1721	4/12/2001	7	12.45		8.93	16.4
2/11/1999	5	7.09		9.6	18.5	1522	2/10/2000	11	1.94		12.61	18.8	1722	4/12/2001	9	12.5		8.75	16.5
2/11/1999	7	6.92		9.39	19.6	1523	3/9/2000	10	8.5	7.67	10.51	16.6	1723	4/12/2001	11	11.66		8.41	16.9
2/11/1999	9	6.75		9.3	19.3	1524	3/9/2000	1	10.35	7.74	10.56	15.5	1724	4/12/2001	13	11.32		8.36	17.3
2/11/1999	11	6.61		9.32	19.1	1525	3/9/2000	3	9.55		10.61	16	1725	4/12/2001	15	11.23		8.37	17.4
2/11/1999	13	6.57		9.34	19.3	1526	3/9/2000	5	9.28		10.53	16.2	1726	4/12/2001	17	11.18		8.37	17.4
2/11/1999	15	6.55		9.35	19.6	1527	3/9/2000	7	8.68		10.45	16.4	1727	4/12/2001	19	11.17		8.32	17.5
2/11/1999	17	6.52		9.44	19.7	1528	3/9/2000	9	8.54		10.47	16.6	1728	4/12/2001	20	11.14	7.66	8.3	17.5
3/18/1999	12	5.58	7.09	10.93	17	1529	4/6/2000	13	12.24	7.65	8.88	17.1	1729	5/10/2001	1	18.35	7.93	8.36	14.9
3/18/1999	1	6.01	7.16	10.53	16.9	1530	4/6/2000	1	12.41	7.67	9.16	15.3	1730	5/10/2001	3	18.35		8.39	14.9
3/18/1999	3	6		10.51	16.2	1531	4/6/2000	3	12.42		9.16	15.3	1731	5/10/2001	5	18.33		8.33	15.1
3/18/1999	5	5.98		10.52	16.9	1532	4/6/2000	5	12.43		9.14	15.3	1732	5/10/2001	7	17.85		7.49	15.3
3/18/1999	7	5.95		10.49	16.5	1533	4/6/2000	7	12.64		9.09	15.8	1733	5/10/2001	9	17.6		7.39	15.6
3/18/1999	9	5.72		10.48	16.8	1534	4/6/2000	9	12.64		9.02	16.3	1734	5/10/2001	11	17.32		7.12	15.9
3/18/1999	11	5.54		10.63	16.8	1535	4/6/2000	11	12.38		8.86	16.4	1735	5/10/2001	12	17.27	7.76	7.2	15.9
4/8/1999	17	10.15	7.81	9.87	16.9	1536	5/11/2000	10	16.29	7.81	6.4	13.8	1736	6/7/2001	1	22.91	7.51	9.36	13.9
4/8/1999	1	12.76	7.98	10.56	15.1	1537	5/11/2000	1	19.1	7.84	7.78	11.4	1737	6/7/2001	3	22.58		9.93	14.3
4/8/1999	3	12.82		10.53	15.1	1538	5/11/2000	3	19.12		7.79	11.4	1738	6/7/2001	5	22.48		10.03	14.5
4/8/1999	5	12.15		10.4	15.4	1539	5/11/2000	5	18.88		7.6	11.7	1739	6/7/2001	7	21.06		5.41	16.4
4/8/1999	7	11.11		10.12	15.7	1540	5/11/2000	7	18.08		7.01	12.3	1740	6/7/2001	9	20.83		4.76	16.8
4/8/1999	9	10.81		10.16	15.9	1541	5/11/2000	9	16.81		6.65	13.5	1741	6/7/2001	11	20.53		3.66	17.3
4/8/1999	11	10.74		10.1	16	1542	6/8/2000	12	20.5	8.03	6.93	13.7	1742	6/7/2001	12	20.5	8.28	3.67	17.4
4/8/1999	13	10.67		10	16.1	1543	6/8/2000	1	20.61	8.11	7.94	13.3	1743	7/12/2001	1	26.47	7.96	6.88	16.3
4/8/1999	15	10.42		9.87	16.3	1544	6/8/2000	3	20.63		7.9	13.4	1744	7/12/2001	3	26.48		6.82	16.4
5/10/1999	12	14.93	7.82	7.26	16.5	1561	6/8/2000	5	20.68		7.83	13.4	1753	7/12/2001	5	26.52		6.64	16.4
5/10/1999	1	17.69	7.92	8.28	15.1	1562	6/8/2000	7	20.71		7.56	13.5	1754	7/12/2001	7	26.2		4.93	17.1
5/10/1999	3	17.11		7.96	15.1	1563	6/8/2000	9	20.64		7.18	13.7	1755	7/12/2001	9	25.93		3.94	17.8
5/10/1999	5	16.83		7.7	15.4	1564	6/8/2000	11	20.57		7.03	13.7	1756	7/12/2001	11	26.04	7.75	4.41	18
5/10/1999	7	15.26		7.5	15.6	1565	7/6/2000	12	23.5	7.7	3.75	16.9	1757	8/9/2001	1	27.16	8.08	8.3	16.8
5/10/1999	9	15.23		7.24	16.2	1566	7/6/2000	1	23.76	8.09	7.38	16	1758	8/9/2001	3	26.98		7.81	17.2
5/10/1999	11	15.16		7.22	16.3	1567	7/6/2000	3	23.93		6.02	16.1	1759	8/9/2001	5	25.43		5.04	18.1
6/14/1999	20	23.34	7.74	4.96	16.9	1568	7/6/2000	5	23.5		3.87	16.5	1760	8/9/2001	7	24.85		3.93	18.5
6/14/1999	1	23.56	7.97	6.93	16.1	1569	7/6/2000	7	23.44		3.72	16.7	1761	8/9/2001	9	24.7		4.34	19.1
6/14/1999	3	23.54		6.5	16.2	1570	7/6/2000	9	23.46		3.81	16.8	1762	8/9/2001	11	24.63		4.07	19.1
6/14/1999	5	23.52		6.23	16.3	1571	7/6/2000	11	23.46		3.76	16.8	1763	8/9/2001	13	24.53		4.08	19.3
6/14/1999	7	23.5		5.92	16.4	1572	8/10/2000	12	25.81	7.31	0.49	17.7	1764	8/9/2001	15	24.47		4.14	19.5
6/14/1999	9	23.47		5.64	16.6	1573	8/10/2000	1	27.17	8.14	6.05	14.4	1765	8/9/2001	17	24.47	7.63	4.16	19.5
6/14/1999	11	23.47		5.4	16.7	1574	8/10/2000	3	27.15		5.81	14.5	1766	9/6/2001	1	25.79	7.9	6.24	17.2
6/14/1999	13	23.36		4.97	16.9	1575	8/10/2000	5	26.92		4.66	15.9	1767	9/6/2001	3	25.78		6.22	17.2
6/14/1999	15	23.34		4.88	16.9	1576	8/10/2000	7	26.07		1.31	17.3	1768	9/6/2001	5	25.83		6.19	17.2
6/14/1999	17	23.34		4.89	16.9	1577	8/10/2000	9	25.89		0.51	17.5	1769	9/6/2001	7	26.08		6.03	17.3
6/14/1999	19	23.34		4.89	16.9	1578	8/10/2000	11	25.81		0.44	17.7	1770	9/6/2001	9	26.04		4.71	18
7/8/1999	18	24.32	7.31	2.51	17.1	1579	9/12/2000	19	23.42	7.44	4.51	17.8	1771	9/6/2001	11	26.01		3.57	18.4
7/8/1999	1	27.97	8.18	7.75	14.8	1580	9/12/2000	1	24.66	8.03	7.85	14.7	1771	9/6/2001	12	26	7.64	3.51	18.4
7/8/1999	3	27.93		7.45	14.9	1581	9/12/2000	3	24.79		7.93	14.8	1772	10/4/2001	1	19.81	7.87	8	18.1
7/8/1999	5	26.34		4.92	16	1582	9/12/2000	5	24.74		7.65	14.9	1773	10/4/2001	3	19.81		7.96	18.2
7/8/1999	7	25.51		4.21	16.7	1583	9/12/2000	7	23.88		3.85	15.6	1774	10/4/2001	5	19.81		7.85	18.2
7/8/1999	9	24.91		3.33	16.9	1584	9/12/2000	9	23.59		3.69	16.2	1775	10/4/2001	7	19.79		7.56	18.3
7/8/1999	11	24.51		2.75	17	1585	9/12/2000	11	23.48		4.09	16.7	1776	10/4/2001	9	19.59		6.64	18.7
7/8/1999	13	24.5		2.75	17	1586	9/12/2000	13	23.48		4.55	17.2	1777	10/4/2001	11	19.45		7.13	18.8
7/8/1999	15	24.47		2.68	17	1587	9/12/2000	15	23.42		4.36	17.4	1778	10/4/2001	12	19.29	7.7	6.85	18.9
7/8/1999	17	24.38		2.54	17.1	1588	9/12/2000	17	23.42		4.39	17.6	1779	11/8/2001	1	14.03	7.73	8.74	20
8/5/1999	12	28.49	8.08	5.4	18.2	1670	10/12/2000	11	17.83	7.87	7.24	16.3	1780	11/8/2001	3	14.04		8.75	20
8/5/1999	1	28.5	8.06	5	18.2	1680	10/12/2000	1	17.24	7.97	7.89	15.7	1781	11/8/2001	5	14		8.7	20
8/5/1999	3	28.51		5.15	18.2	1681	10/12/2000	3	17.24		7.93	15.7	1782	11/8/2001	7	14.41		8.44	20.3
8/5/1999	5	28.5		5.19	18.1	1682	10/12/2000	5	17.22		7.9	15.7	1783	11/8/2001	9	14.45		8.39	20.6
8/5/1999	7	28.5		5.27	18.1	1683	10/12/2000	7	17.36		7.71	15.8	1784	11/8/2001	11	14.36		8.49	20.7
8/5/1999	9	28.5		5.22	18.2	1684	10/12/2000	9	17.88		6.96	16.1	1785	11/8/2001	13	14.35	7.64	8.61	20.7
8/5/1999	11	28.48		5.34	18.2	1685	11/13/2000	1	13.8	7.9	8.84	16.6	1786	12/6/2001	1	13.19	7.72	9.11	20.3
9/9/1999	11	21.88	7.61	4.64	19.7	1686	11/13/2000	3	13.95		8.76	16.7	1787	12/6/2001	3	13.35		8.91	20.5
9/9/1999	1	22.49	7.76	6.25	18	1687	11/13/2000	5	14.05		8.61	16.7	1788	12/6/2001	5	13.39		8.46	20.9
9/9/1999	3	22.49		6.11	18.1	1688	11/13/2000	7	14.12		8.47	16.9	1789	12/6/2001	7	13.38		8.28	21
9/9/1999	5	22.12		5.97	18.3	1689	11/13/2000	9	14.42		7.97	17.5	1790	12/6/2001	9	13.33		8.24	21.3
9/9/1999	7	22.11		5.65	18.4	1690	11/13/2000	11	14.48		7.73	18	1791	12/6/2001	11	13.33		8.26	21.3
9/9/1999	9	21.98		4.86	18.7	1691	11/13/2000	13	14.6		7.25	19	1792	12/6/2001	13	13.33		8.3	21.3
10/12/1999	12	19.72	7.72	5.7	19.7	1692	11/13/2000	15	14.67		6.96	19.6	1793	12/6/2001	14	13.3	7.57	8.36	21.3
10/12/1999	1	19.77	7.86	7.32	17.2	1693	11/13/2000	17	14.7		6.89	19.8	1794	1/16/2002	1	4.92	7.15	10.88	21.5
10/12/1999	3	19.98		6.86	17.4	1694	11/13/2000	18	14.7	7.72	6.98	19.8	1795	1/16/2002	3	4.99		10.88	21.5
10/12/1999	5	20.05		5.86	18.2	1695	12/7/2000	1	5.91	7.91	11.27	18.1	1796	1/16/2002	5	4.94		10.89	21.5
10/12/1999	7	19.85		5.79	19.4	1696	12/7/2000	3	5.95		11.25	18.1	1797	1/16/2002	7	4.97		10.88	21.6
10/12/1999	9	19.77		5.55	19.5	1697	12/7/2000	5	6.26		10.84	18.7	1798	1/16/2002	9	4.95		10.86	21.7
10/12/1999	11	19.74		5.63	19.5	1698	12/7/2000	7	6.5		10.59	19.2	1799	1/16/2002	11	5		10.72	22
11/4/1999	15	15.39	7.88	8.39	18.6	1699	12/7/2000	9	6.54		10.52	19.4	1800	1/16/2002	13	5.05		10.7	22.2
11/4/1999	1	14.95	7.9	8.56	18.2	1700	12/7/2000	11	6.55		10.45	19.6	1801	1/16/2002	15	5.06	7.11	10.77	22.2
11/4/1999	3	15		8.52	18.3	1701	12/7/2000	13	6.57		10.41	19.7	1802	2/14/2002	1	6.49	7.24	10.2	21
11/4/1999	5	15.07		8.49	18.3	1702	12/7/2000	15	6.57		10.31	19.8	1803	2/14/2002	3	6.39		10.21	21.1
11/4/1999	7	15.2		8.41	18.4	1703	12/7/2000	17	6.6		10.17	19.8	1804	2/14/2002	5	6.41		10.24	21
11/4/1999	9	15.31		8.36	18.4	1704	12/7/2000	18	6.6	7.85	10.39	19.9	1805	2/14/2002	7	6.53		10.19	21.1
11/4/1999	11	15.32		8.37	18.5	1705	1/18/2001	1	2.41	7.78	12.88	19.3	1806	2/14/2002	9	6.65		10.15	21.3
11/4/1999	13	15.33		8.39	18.5	1706	1/18/2001	3	2.41		12.75	19.6	1807	2/14/2002	11	6.62		10.09	21.3
12/9/1999	12	9.82	7.67	9.52	19.5	1707	1/18/2001	5	2.43		12.62	19.6	1808	2/14/2002	13	6.59		10.01	21.5
12/9/1999	1	9.45	7.75	9.93	18.5	1708	1/18/2001	7	2.26		12.51	19.9	1809	2/14/2002	14	6.54	7.2	10.03	21.5
12/9/1999	3	9.79		9.75	18.9	1709	1/18/2001	9	2.21		12.48	20	1810	3/14/2002	1	9.25		9.79	21.2
12/9/1999	5	9.79		9.68	19	1710	1/18/2001	11	2.19		12.46	20.1	1811	3/14/2002	3	9.25		9.79	21.2
12/9/1999	7	9.78		9.41	19.1	1711	1/18/2001	12	2.18	7.66	12.47	20.2	1812	3/14/2002	5	9.22		9.84	21.2
12/9/1999	9	9.82		9.42	19.4	1712	2/8/2001	1	2.93	7.85	13.51	19.4	1813	3/14/2002	7	9.19		9.88	21.3
12/9/1999	11	9.82		9.45	19.5	1713	2/8/2001	3	2.63		13.55	19.7	1814	3/14/2002	9	9.07		9.94	21.2
1/13/2000	16	7.49	7.63	9.79	19.1	1714	2/8/2001	5	2.63		13.33	20.1	1815	3/14/2002	11	8.99		9.89	21.2
1/13/2000	1	7.45	7.73	10.3	17.9	1715	2/8/2001	7	2.33		13.35	20.3	1816	3/14/2002	13	8.88		9.73	21.8
1/13/2000	3	7.46		10.27	17.9	1716	2/8/2001	9	2.24		13.33	20.4	1817	4/11/2002	1	13.13	7.9	9.5	19.8
1/13/2000	5	7.49		10.15	18	1717	2/8/2001	11	2.09		13.51	20.5	1818	4/11/2002	3	13.13		9.3	19.9

Continued on next page . . .

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
4/11/2002	5	13.17		9.25	19.9
4/11/2002	7	13.05		8.99	20.1
4/11/2002	9	12.99		9.03	20.3
4/11/2002	11	12.57	7.71	8.86	20.7
5/16/2002	1	19.3	7.87	8.05	18.5
5/16/2002	3	19.33	7.87	8.08	18.5
6/13/2002	1	24.83	8.03	7.34	18.7
6/13/2002	3	24.86	8.02	7.2	18.7
6/13/2002	5	24.73	7.95	6.3	18.8
6/13/2002	7	24.21	7.84	5.7	19
6/13/2002	9	24.11	7.83	5.7	19
6/13/2002	11	24.09	7.83	5.66	19
6/13/2002	13	23.6	7.78	5.3	19
7/11/2002	1	27.56	7.91	5.12	18.6
7/11/2002	3	27.57	7.91	5.09	18.6
7/11/2002	5	27.56	7.9	5.01	18.6
7/11/2002	7	27.54	7.89	4.82	18.7
7/11/2002	9	27.54	7.86	4.73	18.7
7/11/2002	11	27.5	7.72	2.91	18.8
7/11/2002	13	27.19	7.65	2.45	20
7/11/2002	15	27.14	7.64	2.45	19.9
8/7/2002	1	28.01	7.8	4.95	19
8/7/2002	3	28.02	7.8	4.93	19.2
8/7/2002	5	28.01	7.79	4.86	19.1
8/7/2002	7	27.98	7.77	4.67	19.2
8/7/2002	9	28.28	7.61	2.76	19.4
8/7/2002	11	28.09	7.38	1.21	19.8
8/7/2002	13	27.99	7.34	0.79	20.1
8/7/2002	15	27.89	7.31	0.6	20.3
9/12/2002	1	24.84	7.88	6.11	20
9/12/2002	3	24.86	7.87	6.21	20
9/12/2002	5	24.86	7.87	6.24	20
9/12/2002	7	24.88	7.87	6.14	20
9/12/2002	9	24.88	7.86	6.03	20
9/12/2002	11	24.88	7.86	6.14	20
9/12/2002	12	24.89	7.86	6.92	20
10/10/2002	1	23.1	7.61	6.13	21.1
10/10/2002	3	23.11	7.6	6.13	21.1
10/10/2002	5	23.16	7.59	6.11	21.2
10/10/2002	7	23.05	7.61	6.29	21.2
10/10/2002	9	23.02	7.61	6.33	21.1
10/10/2002	11	23.03	7.61	6.32	21.2
10/10/2002	12	23.03	7.6	6.37	21.1
11/25/2002	1	10.16		10.17	18.2
11/25/2002	3	10.75		9.81	18.7
11/25/2002	5	10.8		9.47	18.9
11/25/2002	7	10.95		9.4	19.1
11/25/2002	9	11.11		9.15	19.3
11/25/2002	11	11.14		9.03	19.5
11/25/2002	13	11.15		9.07	19.5
12/17/2002	1	4.98		11.23	18.2
12/17/2002	3	5.01		11.26	18.2
12/17/2002	5	5.09		11.24	18.4
12/17/2002	7	5.19		11.2	18.6
12/17/2002	9	5.31		11.14	18.9
12/17/2002	11	5.34		11.14	18.9
12/17/2002	13	5.36		11.22	19
12/17/2002	14	5.37		11.3	19
2/6/2003	1	1.66	7.58	12.38	15.5
2/6/2003	3	1.7	7.56	12.37	15.5
2/6/2003	5	1.83	7.55	12.31	15.6
2/6/2003	7	1.73	7.51	12.24	15.7
2/6/2003	9	1.67	7.48	12.26	15.8
2/6/2003	11	1.71	7.48	12.29	15.9
2/6/2003	13	1.67	7.44	12.28	16
2/6/2003	15	1.59	7.4	12.28	16.2
3/10/2003	1	5.41	7.96	13.17	12
3/10/2003	3	5.49	7.95	13.14	12
3/10/2003	5	4.94	7.82	13.09	12.9
3/10/2003	7	4.06	7.69	12.47	14.2
3/10/2003	9	3.73	7.62	12.33	15.3
3/10/2003	11	3.74	7.6	12.36	15.3
3/10/2003	12	3.75	7.37	12.32	15.3
4/3/2003	1	10.62	8.51	10.62	10.9
4/3/2003	3	10.65	8.56	10.57	10.9
4/3/2003	5	10.69	8.65	10.43	11
4/3/2003	7	9.36	8.64	9.46	13.5
4/3/2003	9	8.81	8.65	9.61	15.4
4/3/2003	11	8.73	8.64	9.62	15.9
4/3/2003	13	8.71	8.62	9.71	16
4/3/2003	14	8.71	8.56	9.77	16.1
5/15/2003	1	17.84	8.58	9.31	10.96
5/15/2003	3	17.83	8.58	9.25	10.96
5/15/2003	5	17.83	8.58	8.79	10.97
5/15/2003	7	17.08	8.15	6.46	12.58
5/15/2003	9	16.45	7.85	5.28	14.26
5/15/2003	11	15.47	7.54	3.92	16.4
5/15/2003	13	15.04	7.45	3.61	17.65
5/15/2003	14	14.98	7.44	3.78	17.86
6/12/2003	1	22.37	8.04	7.35	9.83
6/12/2003	3	22.12	8.04	7.21	10.22
6/12/2003	5	21.51	7.96	6.64	11.25
6/12/2003	7	19.2	7.41	3.2	13.12
6/12/2003	9	18.98	7.36	2.9	13.27
6/12/2003	11	18.35	7.27	2.19	13.85
6/12/2003	13	18.27	7.24	2.12	13.92
6/12/2003	14	18.22	7.24	2.13	13.94
7/2/2003	1	26.74	8.75	8.85	9.41
7/2/2003	3	26.84	8.76	8.91	9.47
7/2/2003	5	25.57	8.15	4.55	10.32
7/2/2003	7	23.67	7.24	0.22	11.24
7/2/2003	9	22.61	7.23	0.21	12.65
7/2/2003	11	22.38	7.24	0.24	13.45
7/2/2003	12	22.33	7.24	0.3	13.91
8/14/2003	1	27.55	8.4	9.01	12.9
8/14/2003	3	27.65	8.43	9	13.02
8/14/2003	5	27.69	8.3	7.64	13.49
8/14/2003	7	27.37	8.22	6.37	13.97
8/14/2003	9	26.81	7.82	3.4	14.54
8/14/2003	11	26.67	7.73	2.86	14.71
8/14/2003	12	26.5	7.67	2.51	15.02
9/11/2003	1	24.37	7.95	6.88	13.1
9/11/2003	3	24.37	7.95	6.88	13.12
9/11/2003	5	24.59	7.93	6.93	13.41
9/11/2003	7	24.76	7.9	6.64	13.87
9/11/2003	9	25.02	7.82	5.06	14.38
9/11/2003	11	25.22	7.58	2.68	15.67
9/11/2003	12	25.26	7.49	2.21	16.16
10/9/2003	1	20.34	8.2	9.44	11.24
10/9/2003	3	20.36	8.21	9.35	11.24
10/9/2003	5	20.34	7.91	7.29	11.61
10/9/2003	7	20.33	7.71	5.96	12.04
10/9/2003	9	20.44	7.46	4.04	13.87
10/9/2003	11	20.45	7.46	3.82	14.72
10/9/2003	13	20.52	7.41	3.69	14.92
11/6/2003	1	17.82	7.97	8.94	12.72
11/6/2003	3	17.35	7.85	8.14	13.31
11/6/2003	5	16.59	7.78	7.6	14.03
11/6/2003	7	16.48	7.75	7.44	14.24
11/6/2003	9	16.5	7.77	7.49	14.3
11/6/2003	11	16.5	7.78	7.59	14.36
11/6/2003	13	16.5	7.78	7.54	14.37
11/6/2003	15	16.51	7.77	7.56	14.37
11/6/2003	17	16.52	7.77	7.63	14.39
12/4/2003	1	8.42	7.9	11.01	10.27
12/4/2003	3	9.04	7.96	10.96	10.78
12/4/2003	5	9.14	7.97	10.91	10.96
12/4/2003	7	9.87	8.03	10.47	12.82
12/4/2003	9	9.79	8.08	10.18	13.64
12/4/2003	11	9.78	8.08	10.13	13.82
12/4/2003	13	9.79	8.09	10.17	13.88
12/4/2003	15	9.79	8.09	10.17	13.89
1/8/2004	1	5.99	8.02	12.14	9.37
1/8/2004	3	6.06	8.01	12.09	9.39
1/8/2004	5	6.3	8	11.97	9.57
1/8/2004	7	6.5	8	11.86	9.71
1/8/2004	9	6.79	7.96	11.57	10.12
1/8/2004	10	6.78	7.88	11.48	10.66
2/11/2004	1	1.83	7.52	13.1	9.63
2/11/2004	3	1.81	7.52	13.1	9.73
2/11/2004	5	1.85	7.53	13.03	9.8
2/11/2004	7	1.95	7.52	12.97	9.89
2/11/2004	9	1.75	7.53	13.02	10.11
2/11/2004	10	1.74	7.53	13.03	10.15
3/15/2004	1	7.7	8.03	12.79	11.71
3/15/2004	3	7.7	8.03	12.65	11.72
3/15/2004	5	7.68	8.02	12.6	11.73
3/15/2004	7	7.62	8.01	12.53	11.8
3/15/2004	9	7.36	7.96	12.45	12.15
3/15/2004	11	7.17	7.93	12.48	12.39
4/8/2004	1	9.34	7.83	11.54	12.48
4/8/2004	3	9.22	7.83	11.41	12.85
4/8/2004	5	9.12	7.83	11.38	12.97
4/8/2004	7	8.98	7.82	11.29	13.15
4/8/2004	9	8.77	7.81	11.23	13.29
4/8/2004	11	8.49	7.8	11.1	13.58
4/8/2004	12	8.36	7.8	11.28	14.01
5/6/2004	1	16.4	8.27	10.66	10.66
5/6/2004	3	16.56	8.25	10.81	10.83
5/6/2004	5	16.6	8.23	10.35	11.01
5/6/2004	7	15.81	7.95	8.64	12.81
5/6/2004	9	15.72	7.93	8.57	12.98
5/6/2004	11	15.66	7.91	8.45	13.06
6/3/2004	1	23.31	7.89	7.29	12.08
6/3/2004	3	23.34	7.94	6.93	12.09
6/3/2004	5	23.35	7.91	6.8	12.11
6/3/2004	7	23.39	7.81	5.9	12.41
6/3/2004	9	22.61	7.4	2.27	14.14
6/3/2004	11	22.18	7.31	1.62	14.77
6/3/2004	12	22.18	7.32	1.69	14.8
7/8/2004	1	26.99	8.29	8.02	13.26
7/8/2004	3	26.98	8.28	8.02	13.31
7/8/2004	5	26.61	7.92	4.85	14.22
7/8/2004	7	26.19	7.87	3.67	15.14
7/8/2004	9	25.7	7.69	2.29	15.75
7/8/2004	11	25.52	7.62	1.81	15.97
7/8/2004	13	25.36	7.59	1.48	16.23
7/8/2004	14	25.3	7.57	1.45	16.38
8/4/2004	1	27.39	8.22	7.75	13.21
8/4/2004	3	27.4	8.21	7.7	13.22
8/4/2004	5	27.43	8.17	7.41	13.44
8/4/2004	7	27.46	8.12	7.03	13.75
8/4/2004	9	27.1	7.84	4.42	15.42
8/4/2004	11	27.09	7.84	4.4	15.46
8/4/2004	12	27.05	7.82	4.18	15.61
9/14/2004	1	25.47	8.29	9.12	12.17
9/14/2004	3	25.71	8.05	7.67	12.86
9/14/2004	5	25.7	8.07	7.85	12.97
9/14/2004	7	25.63	7.76	5.7	14.23
9/14/2004	9	25.59	7.64	4.29	15.21
9/14/2004	11	25.55	7.5	3.24	15.96
9/14/2004	13	25.52	7.43	2.73	16.46
9/14/2004	14	25.51	7.41	2.63	16.61
10/14/2004	1	19.72	8.1	7.77	10.76
10/14/2004	3	19.78	8.09	7.75	10.76
10/14/2004	5	20.02	8.07	7.49	10.91
10/14/2004	7	20.09	8.07	7.37	11.04
10/14/2004	9	20.09	8.06	7.37	11.05
10/14/2004	11	20.1	8.06	7.5	11.07
11/22/2004	1	12.42	8.11	10.95	10.91
11/22/2004	3	12.35	8.09	10.74	11.28
11/22/2004	5	12.32	8.03	10.31	12.07
11/22/2004	7	12.13	7.94	9.87	12.82
11/22/2004	9	12.13	7.92	9.69	13.6
11/22/2004	11	12.18	7.9	9.52	13.9
12/21/2004	1	5.68	8.04	12.77	12.15
12/21/2004	3	5.72	8.04	13.29	12.14
12/21/2004	5	5.76	8.05	12.45	12.19
12/21/2004	7	5.95	8.07	12.47	12.3
12/21/2004	9	6.74	8.12	12.05	12.69
12/21/2004	11	6.88	8.12	12.27	12.84
12/21/2004	13	6.92	8.11	14.01	12.87
1/12/2005	1	6.93	8.36	13.93	11.17
1/12/2005	3	6.9	8.35	13.73	11.3
1/12/2005	5	6.85	8.32	13.49	11.38
1/12/2005	7	6.75	8.28	13.36	11.58
1/12/2005	9	6.7	8.26	13.22	11.62
1/12/2005	11	6.69	8.25	13.07	11.64
2/9/2005	1	3.34	7.99	14.44	10.31
2/9/2005	3	3.31	7.98	14.32	10.37
2/9/2005	5	3.06	7.95	14.2	10.51
2/9/2005	7	2.61	7.87	13.96	10.99
2/9/2005	9	2.15	7.79	13.76	11.65
2/9/2005	11	2.02	7.74	13.61	12.19
2/9/2005	13	1.92	7.71	13.55	12.48
2/9/2005	14	1.67	7.64	13.48	13.54
3/10/2005	1	4.27	7.91	12.75	10.69
3/10/2005	3	4.43	7.88	12.66	10.95
3/10/2005	5	4.4	7.9	12.71	11.29
3/10/2005	7	4.38	7.91	12.7	11.47
3/10/2005	9	4.48	7.89	12.64	11.8
3/10/2005	11	4.44	7.88	12.59	11.97
3/10/2005	13	4.4	7.87	12.62	12.19
3/10/2005	15	4.38	7.85	12.61	12.21
4/7/2005	1	11.8	8.17	12.15	8.96
4/7/2005	3	11.77	8.16	12.18	9.01
4/7/2005	5	11.75	8.16	12.25	9.22
4/7/2005	7	9.77	7.95	11.77	11.4
4/7/2005	9	8.93	7.78	11.5	13.06
4/7/2005	11	8.67	7.6	11.18	13.85
5/12/2005	1	17.35	8.28	10.09	11.04
5/12/2005	3	17.35	8.21	9.7	11.25
5/12/2005	5	16.87	8.19	9.55	11.26
5/12/2005	7	16.47	8.13	9.11	11.3
5/12/2005	9	15.68	8.03	8.65	11.35
5/12/2005	11	15.49	7.99	8.54	11.47
5/12/2005	12	15.32	7.92	8.24	11.64
6/9/2005	1	24.25	8.24	8.39	10.71
6/9/2005	3	23.93	8.17	8.07	10.82
6/9/2005	5	22.13	7.96	7.2	10.97
6/9/2005	7	20.65	7.61	5.65	11.45
6/9/2005	9	19.92	7.62	5.37	12.35
6/9/2005	11	19.42	7.67	5.24	13.34
6/9/2005	12	19.33	7.63	5.14	13.45
7/7/2005	1	27.33	8.22	6.95	13.44
7/7/2005	3	27.33	8.22	6.99	13.43
7/7/2005	5	27.26	8.1	6.1	13.55
7/7/2005	7	25.94	7.57	2.38	14.95
7/7/2005	9	24.85	7.43	1.29	16.29
7/7/2005	11	23.98	7.31	0.57	17.41
7/7/2005	12	23.92	7.32	0.64	17.47
8/9/2005	1	28.74	8.16	7.34	14.34
8/9/2005	3	28.76	8.14	7.06	14.37
8/9/2005	5	28.98	7.85	4.27	14.95
8/9/2005	7	29	7.78	3.6	15.04
8/9/2005	9	28.78	7.49	1.46	15.72
8/9/2005	11	28.54	7.42	0.89	16.35
9/12/2005	1	25.6	7.83	6.29	16.36
9/12/2005	3	25.59	7.82	6.27	16.38
9/12/2005	5	25.6	7.83	6.26	16.38
9/12/2005	7	25.61	7.83	6.29	16.38
9/12/2005	9	25.61	7.82	6.22	16.39
9/12/2005	11	25.59	7.8	6.17	16.43
10/4/2005	1	23.49	8.1	8.52	16.87
10/4/2005	3	23.52	8.1	8.55	16.91
10/4/2005	5	23.71	7.91	6.07	17.28
10/4/2005	7	24.03	7.6	4.09	17.89
10/4/2005	9	24.05	7.56	3.65	18.3
10/4/2005	11	24.02	7.55	3.61	18.51
11/1/2005	1	13.97	8.12	11.23	15.14
11/1/2005	3	14.58	8.05	10.47	15.84
11/1/2005	5	14.82	7.96	9.79	16.66
11/1/2005	7	14.82	7.89	9.4	17.2
11/1/2005	9	14.8	7.89	9.43	17.46
11/1/2005	11	14.77	7.89	9.37	17.59
11/1/2005	12	14.75	7.89	9.45	17.64
12/7/2005	1	7.99	8.13	9.61	15.98
12/7/2005	3	8.27	8.13	9.48	16.22
12/7/2005	5	8.31	8.13	9.42	16.28
12/7/2005	7	8.5	8.12	9.34	16.51
12/7/2005	9	8.93	8.13	9.24	16.97
12/7/2005	11	8.94	8.11	9.16	17.37
12/7/2005	12	8.96	8.11	9.2	17.38

Continued on next page . . .

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)		Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
1/4/2006	1	6.07	7.98	11.3	14.78		6/6/2007	1	22.8	7.9	7	12.5		5/14/2008	9	17.6	7.7	7.3	13
1/4/2006	3	6.06	7.98	11.21	14.98		6/6/2007	2	22.8	7.9	7	12.6		5/14/2008	10	17.6	7.7	7.3	13.1
1/4/2006	5	6.04	7.97	11.15	15.04		6/6/2007	3	22.8	8	7	12.6		6/10/2008	1	26.9	8.2	8.5	10.2
1/4/2006	7	6.02	7.97	11.24	15.06		6/6/2007	4	22.8	7.9	6.8	12.7		6/10/2008	2	26.6	8.1	7.7	10.6
1/4/2006	9	6.02	7.96	10.94	15.17		6/6/2007	5	22.7	7.9	6.7	12.9		6/10/2008	3	24.3	7.7	5.6	11.2
1/4/2006	11	6.01	7.96	10.96	15.26		6/6/2007	6	22.7	7.9	6.3	13		6/10/2008	4	23.8	7.6	5.3	11.5
1/4/2006	13	6	7.96	10.93	15.4		6/6/2007	7	22.5	7.8	5.3	14		6/10/2008	5	23	7.6	4.9	12
3/8/2006	1	5.2	8.2	14.2	11.71		6/6/2007	8	21.2	7.7	5	15.7		6/10/2008	6	22.9	7.6	4.9	12.1
3/8/2006	3	5.5	8.2	13.9	11.97		6/6/2007	9	20.9	7.7	4.9	16		6/10/2008	7	22.9	7.6	4.8	12.2
3/8/2006	5	5.6	8.2	13.9	12.34		6/6/2007	10	20.8	7.7	5.2	16.4		6/10/2008	8	22.8	7.6	4.8	12.3
3/8/2006	7	5.7	8.2	13.9	12.57		7/11/2007	1	27.9	8.1	6.8	15.2		6/10/2008	9	22.8	7.6	4.8	12.3
3/8/2006	9	5.5	8.1	13.3	12.94		7/11/2007	2	27.9	8.1	6.7	15.2		7/8/2008	1	26.4	8	7	13
3/8/2006	11	5.4	8.1	12.9	13.06		7/11/2007	3	27.9	8.1	6.5	15.2		7/8/2008	2	26.4	8	6.9	13.1
3/8/2006	12	5.3	8	12.7	13.16		7/11/2007	4	27.9	8.1	5.9	15.2		7/8/2008	3	26.4	7.8	6.3	13.1
4/10/2006	1	11.9	8.3	9.9	12.8		7/11/2007	5	26.1	7.5	2.9	16.1		7/8/2008	4	26.4	7.8	5.3	13.4
4/10/2006	3	12	8.3	9.9	12.9		7/11/2007	6	25.8	7.5	2.7	16.9		7/8/2008	5	26.2	7.6	3.8	13.7
4/10/2006	5	12.2	8.3	9.7	13		7/11/2007	7	25.3	7.4	2.6	17.5		7/8/2008	6	26	7.4	2.7	13.9
4/10/2006	7	12.2	8.2	9	13.5		7/11/2007	8	25.2	7.4	2.6	17.6		7/8/2008	7	25.9	7.4	2.2	14.4
4/10/2006	9	11.4	7.8	7.8	14.9		7/11/2007	9	25.2	7.4	2.7	17.6		7/8/2008	8	25.8	7.4	2.2	14.3
4/10/2006	11	11.2	7.7	7.7	15.2		7/11/2007	10	25.2	7.4	3.5	17.7		7/8/2008	9	25.8	7.4	2.1	14.5
5/23/2006	1	19.1	7.9	8.7	14.2		8/9/2007	1	29.7	8.1	6.7	16.7		8/12/2008	1	26.7	8.1	6.7	14.6
5/23/2006	3	19.1	7.9	8.6	14.3		8/9/2007	2	29.7	8.1	6.7	16.7		8/12/2008	2	26.7	8.1	6.6	14.6
5/23/2006	5	19.1	7.9	8.4	14.3		8/9/2007	3	29.7	8.1	6.6	16.7		8/12/2008	3	26.7	8	6.6	14.6
5/23/2006	7	19.2	7.8	7.7	15		8/9/2007	4	29.6	8	5.8	17		8/12/2008	4	26.7	8	6.5	14.6
5/23/2006	9	18.1	7.5	5	17.2		8/9/2007	5	28.7	7.8	4.3	17.8		8/12/2008	5	26.7	8	6.5	14.6
5/23/2006	11	17.9	7.4	4.7	17.5		8/9/2007	6	28.5	7.8	3.7	18		8/12/2008	6	26.7	8	6.4	14.6
6/19/2006	1	23.5	8	8.5	15.7		8/9/2007	7	27.4	7.6	2.6	19.2		8/12/2008	7	26.7	8	6.4	14.6
6/19/2006	5	23.5	8	8.3	15.7		8/9/2007	8	27.3	7.6	2.3	19.3		8/12/2008	8	26.8	8	5.8	14.7
6/19/2006	7	23.5	8	7.9	15.7		8/9/2007	9	27	7.5	1.9	19.7		8/12/2008	9	26.8	8	5.1	14.8
6/19/2006	9	22.9	7.7	6	15.8		8/9/2007	10	27	7.5	1.9	19.7		9/18/2008	1	24.1	7.9	6.9	15.4
6/19/2006	11	22.5	7.7	5.6	16		9/12/2007	1	27	7.7	5.1	18.2		9/18/2008	2	24.1	7.9	6.8	15.4
6/19/2006	12	22.5	7.7	5.6	16		9/12/2007	2	27	7.7	5.1	18.2		9/18/2008	3	24.1	7.9	6.8	15.4
7/12/2006	1	26.6	7.9	7.2	15.4		9/12/2007	3	27	7.7	5.1	18.2		9/18/2008	4	24.1	7.9	6.8	15.4
7/12/2006	3	26.6	7.9	6.8	15.4		9/12/2007	4	27	7.7	5	18.2		9/18/2008	5	24.2	7.9	6.3	15.4
7/12/2006	5	26.2	7.4	4.2	15.9		9/12/2007	5	27	7.7	4.9	18.2		9/18/2008	6	24.7	7.7	4.7	16.1
7/12/2006	7	26.2	7.4	3.7	15.9		9/12/2007	6	27	7.7	4.8	18.3		9/18/2008	7	25.1	7.5	4	17.3
7/12/2006	9	26.2	7.4	3.7	16		9/12/2007	7	27	7.7	4.1	18.3		9/18/2008	8	25.1	7.6	4.3	18.1
7/12/2006	11	26.2	7.4	3.7	16		9/12/2007	8	27	7.5	2.9	19.4		9/18/2008	9	25.1	7.7	4.6	18.4
8/9/2006	1	29.4	8	5.3	14.9		9/12/2007	9	26.9	7.6	3.2	20		10/15/2008	1	20.9	8	8.4	16.5
8/9/2006	3	29.4	8	5.3	14.9		9/12/2007	10	26.9	7.6	3	20.2		10/15/2008	2	20.9	8	8.4	16.5
8/9/2006	5	29.4	8	5.1	15		10/10/2007	1	24.9	7.9	7	18.9		10/15/2008	3	21	8	8.3	16.5
8/9/2006	7	29.6	7.9	3.7	15.3		10/10/2007	2	24.9	7.9	7	18.9		10/15/2008	4	21	8	8.1	16.6
8/9/2006	9	29.6	7.9	3.5	15.4		10/10/2007	3	24.9	7.9	6.7	18.9		10/15/2008	5	21	7.9	7.8	16.7
8/9/2006	11	29.1	7.6	1.6	15.9		10/10/2007	4	24.9	7.8	6.7	19		10/15/2008	6	20.9	7.9	7.2	16.8
9/13/2006	1	23.9	7.7	7.3	16.4		10/10/2007	5	24.9	7.8	6	19		10/15/2008	7	20.8	7.8	6.6	16.9
9/13/2006	3	23.9	7.7	7.1	16.4		10/10/2007	6	24.5	7.6	4.7	19.4		10/15/2008	8	20.7	7.7	6.1	17.4
9/13/2006	5	23.9	7.7	7.1	16.4		10/10/2007	7	24.2	7.5	4.1	19.9		10/15/2008	9	20.6	7.7	6.1	17.8
9/13/2006	7	23.9	7.7	7.5	16.3		10/10/2007	8	24.1	7.5	4.1	20		11/12/2008	1	13	7.8	9.1	17.9
9/13/2006	9	23.9	7.7	7.1	16.3		10/10/2007	9	24.1	7.5	4.1	20		11/12/2008	2	13.2	7.8	9.1	18
9/13/2006	11	23.8	7.8	7.9	16.5		12/11/2007	1	8.9	7.8	10.2	18.7		11/12/2008	3	13.2	7.8	9.2	18.1
9/13/2006	13	23.9	7.7	7.4	16.6		12/11/2007	2	8.8	7.8	9.9	18.7		11/12/2008	4	13.4	7.8	9.1	18.3
10/11/2006	1	20.2	7.9	8	15.6		12/11/2007	3	8.7	7.8	9.6	19		11/12/2008	5	13.4	7.8	8.9	18.4
10/11/2006	3	20.2	7.9	7.9	15.6		12/11/2007	4	8.5	7.8	9.4	19.5		11/12/2008	6	13.5	7.8	8.7	18.5
10/11/2006	5	20.2	7.9	7.7	15.6		12/11/2007	5	8.5	7.8	9.3	19.7		11/12/2008	7	13.8	7.7	8.3	19
10/11/2006	7	20.1	7.8	7.1	15.7		12/11/2007	6	8.5	7.8	9.3	19.8		11/12/2008	8	13.9	7.7	8.2	19.2
10/11/2006	9	20	7.8	6.7	16		12/11/2007	7	8.4	7.8	9.3	19.8		11/12/2008	9	14	7.7	8.3	19.3
10/11/2006	11	20	7.8	6.8	16.1		12/11/2007	8	8.4	7.7	9.3	19.9		12/3/2008	1	7.4	7.9	10.2	18.3
10/11/2006	12	20	7.7	6.7	16.1		12/11/2007	9	8.4	7.7	9.3	20		12/3/2008	2	7.5	7.9	10.2	18.3
11/14/2006	1	13.3	7.8	9.2	14.6		1/22/2008	1	4.7	7.7	11	18		12/3/2008	3	7.6	7.9	10.3	18.4
11/14/2006	3	13.3	7.8	9.3	14.6		1/22/2008	2	4.7	7.7	11	18		12/3/2008	4	7.6	7.9	10.2	18.4
11/14/2006	5	13.3	7.8	9.2	14.8		1/22/2008	3	4.8	7.7	11.1	18		12/3/2008	5	7.6	7.9	10.2	18.4
11/14/2006	7	13.5	7.8	9	15.2		1/22/2008	4	5	7.7	11	18.1		12/3/2008	6	7.6	7.9	10.2	18.4
11/14/2006	9	13.6	7.8	9.3	15.6		1/22/2008	5	5.1	7.7	11	18.2		12/3/2008	7	7.6	7.9	10.1	18.5
11/14/2006	11	13.7	7.8	9	16.1		1/22/2008	6	5.1	7.7	10.9	18.2		12/3/2008	8	8.2	7.8	10	19.5
12/11/2006	1	7.2	8.1	11.3	12.3		1/22/2008	7	5.1	7.7	10.9	18.2		12/3/2008	9	8.3	7.8	10	19.7
12/11/2006	3	7.9	8	10.6	12.9		1/22/2008	8	5.4	7.7	10.9	18.4		1/13/2009	1	5.4	7.5	11.4	17.3
12/11/2006	5	8	8	10.4	13.2		1/22/2008	9	5.4	7.7	11.1	18.4		1/13/2009	2	5.4	7.5	11.5	17.3
12/11/2006	7	8.5	7.9	9.5	14.2		2/12/2008	1	6.9	7.8		17.6		1/13/2009	3	5.5	7.5	11.5	17.3
12/11/2006	9	8.5	7.9	9.8	14.6		2/12/2008	2	6.9	7.8		17.6		1/13/2009	4	5.5	7.5	11.7	17.4
12/11/2006	10	8.5	7.9	9.8	14.7		2/12/2008	3	6.8	7.8		17.6		1/13/2009	5	5.5	7.5	11.7	17.5
1/18/2007	1	8.3	8.1	10.4	11.4		2/12/2008	4	6.9	7.8		17.6		1/13/2009	6	5.6	7.5	11.9	17.5
1/18/2007	3	8.7	8.1	10.2	12.6		2/12/2008	5	6.9	7.8		17.6		1/13/2009	7	5.6	7.5	12	17.6
1/18/2007	5	8.9	8.1	10.1	13		2/12/2008	6	6.9	7.8		17.7		1/13/2009	8	5.6	7.5	12.2	17.6
1/18/2007	7	9.1	8.1	9.8	13.6		2/12/2008	7	7	7.8		17.8		1/13/2009	9	5.6	7.5	12.2	17.6
1/18/2007	9	9.2	8	9.5	14.5		2/12/2008	8	7	7.8		17.8		2/10/2009	1	3.5	7.6	14.6	16.7
1/18/2007	10	9.2	8	9.5	14.7		3/11/2008	1	8.5	7.8	10.3	16.5		2/10/2009	2	3.5	7.6	14.2	16.7
2/26/2007	1	3.2	7.8	12.2	13		3/11/2008	2	8.5	7.8	10.3	16.5		2/10/2009	3	3.5	7.6	14.5	16.6
2/26/2007	3	3.2	7.8	12.2	13		3/11/2008	3	8.6	7.8	10.3	16.5		2/10/2009	4	3.5	7.6	14	16.7
2/26/2007	5	3.2	7.8	12.1	13.1		3/11/2008	4	8.6	7.8	10.3	16.5		2/10/2009	5	3.5	7.6	14.3	16.7
2/26/2007	7	3.2	7.8	12	13.7		3/11/2008	5	8.5	7.7	10.3	16.5		2/10/2009	6	3.4	7.6	13.8	16.7
2/26/2007	9	3.1	7.8	12.1	14.2		3/11/2008	6	8.6	7.8	10.3	16.5		2/10/2009	7	3.4	7.6	13.4	16.8
2/26/2007	10	3.1	7.8	12.1	14.2		3/11/2008	7	8.6	7.8	10.3	16.5		2/10/2009	8	3.3	7.6	13.7	16.8
4/25/2007	1	15.3	8.7	11.5	9.9		3/11/2008	8	8.6	7.8	10.3	16.5		2/10/2009	9	3.3	7.6	14.2	16.8
4/25/2007	2	15.2	8.6	11.2	9.9		3/11/2008	9	8.6	7.8	10.4	16.5		3/10/2009	1	6.4	7.5	11.4	16.5
4/25/2007	3	14.4	8.6	10.8	10		4/24/2008	1	16	7.8	8.3	13.4		3/10/2009	2	6.4	7.5	11.4	16.5
4/25/2007	4	13.9	8.5	9.6	10.1		4/24/2008	2	16	7.8	8.3	13.4		3/10/2009	3	6.4	7.4	11.3	16.5
4/25/2007	5	12.2	8	8.4	10.9		4/24/2008	3	16	7.8	8.3	13.4		3/10/2009	4	6.4	7.4	11.3	16.5
4/25/2007	6	11.6	7.8	8.3	11.2		4/24/2008	4	16	7.8	8.2	13.4		3/10/2009	5	6.4	7.5	11.3	16.5
4/25/2007	7	11.5	7.8	8.3	11.2		4/24/2008	5	16.1	7.7	8.2	13.4		3/10/2009	6	6.4	7.4	11.3	16.5
4/25/2007	8	11.3	7.8	8.5	11.5		4/24/2008	6	16.1	7.7	8.2	13.5		3/10/2009	7	6.3	7.4	11.3	16.6
4/25/2007	9	11.2	7.8	8.7	11.6		4/24/2008	7	16.1	7.7	8.2	13.5		3/10/2009	8	6.2	7.5	11.5	16.7
4/25/2007	10	11.2	7.8	9	11.6		4/24/2008	8	16.1	7.7	8.2	13.5		3/10/2009	9	6.2	7.4	11.2	16.7
5/9/2007	1	16	8.1	7.6	9.2		4/24/2008	9	16.1	7.7	8.2	13.5		4/27/2009	1	17.1	7.7	8.8	14.8
5/9/2007	2	16	8.1	7.6	9.5		5/14/2008	1	16.6	7.8	8.7	10.9		4/27/2009	2	17	7.6	8.6	14.6
5/9/2007	3	16.1	8.1	7.4	9.6		5/14/2008	2	16.8	7.8	8.6	11.1		4/27/2009	3	16.4	7.5	8.1	14.8
5/9/2007	4	16	8.1	7.4	9.7		5/14/2008	3	17	7.8	8.4	11.4		4/27/2009	4	15.6	7.4	8	14.9
5/9/2007	5	16	8	7.2	10.1		5/14/2008	4	17	7.8	8.2	11.7		4/27/2009	5	15.6	7.4	8	14.9
5/9/2007	6	15.9	8	7	10.3		5/14/2008	5	17.1	7.8	8.1	12		4/27/2009	6	15.5	7.4	7.9	15
5/9/2007	7	16	8	7	10.5		5/14/2008	6	17.1	7.8	8	12.1		4/27/2009	7	15.3	7.4	8	15.1
5/9/2007	8	15.9	8	6.6	10.6		5/14/2008	7	17	7.7	7.9	12.2		4/27/2009	8	15.2	7.4	8	15.2
5/9/2007	9	15.8	7.9	6.6	10.9		5/14/2008	8	17.4	7.7	7.5	12.5		4/27/2009	9	15.2	7.4	8.1	15.2

Continued on next page . . .

Data from Rappahannock River Monitoring Station 3-RPP010.60
Windmill Point Resort & Yacht Club Harbor - VA0060569

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
5/12/2009	1	19	7.7	8.2	13.3
5/12/2009	2	19	7.7	8.2	13.3
5/12/2009	3	19	7.7	8.2	13.3
5/12/2009	4	19.1	7.7	8.1	13.4
5/12/2009	5	19.1	7.7	8	13.7
5/12/2009	6	19.1	7.7	8	13.8
5/12/2009	7	19.1	7.7	8	13.8
5/12/2009	8	19.1	7.7	8	13.9
5/12/2009	9	19	7.5	6.6	15
6/10/2009	1	23.4	7.7	6.7	13.4
6/10/2009	2	23.5	7.7	6.9	13.4
6/10/2009	3	23.5	7.7	6.6	13.5
6/10/2009	4	23.5	7.7	6.7	13.6
6/10/2009	5	23.5	7.7	6.7	13.7
6/10/2009	6	23.5	7.7	6.6	13.8
6/10/2009	7	23.5	7.7	6.5	13.9
6/10/2009	8	23.4	7.7	5.9	13.9
6/10/2009	9	23	7.4	4.5	14.7
7/14/2009	1	26	7.9	6.8	14.1
7/14/2009	2	25.9	7.9	7.2	14
7/14/2009	3	25.9	7.9	6.8	14
7/14/2009	4	25.9	7.9	6.8	14
7/14/2009	5	26	7.9	6.5	14.1
7/14/2009	6	26	7.7	5.3	14.3
7/14/2009	7	25.8	7.5	3.7	14.7
7/14/2009	8	25.6	7.4	3.4	15.4
7/14/2009	9	25.5	7.5	3.5	15.6
7/14/2009	10	25.4	7.4	3.3	16.4
7/14/2009	11	25.4	7.4	3.2	16.5
7/14/2009	12	25.4	7.4	3.3	16.7
7/14/2009	13	25.4	7.4	3.2	16.7
8/11/2009	1	28.2	7.8	6.8	15.9
8/11/2009	2	28.2	7.8	6.7	15.9
8/11/2009	3	28.3	7.8	6.4	16.1
8/11/2009	4	28.1	7.8	5.7	16.4
8/11/2009	5	27.8	7.6	4.4	16.6
8/11/2009	6	27.7	7.4	3.2	16.8
8/11/2009	7	27.6	7.6	4.2	17.1
8/11/2009	8	27.5	7.6	4	17.3
8/11/2009	9	27.5	7.5	3.9	17.3
8/11/2009	10	27.5	7.5	3.9	17.3
8/11/2009	11	27.5	7.5	3.8	17.3
8/11/2009	12	27.5	7.5	3.8	17.3
8/11/2009	13	27.5	7.5	4	17.4
9/28/2009	1	22.8	7.8	6.1	16.3
9/28/2009	2	22.8	7.8	6.2	16.3
9/28/2009	3	22.8	7.8	6.1	16.3
9/28/2009	4	22.8	7.8	6.2	16.3
9/28/2009	5	22.8	7.8	6.1	16.3
9/28/2009	6	22.8	7.8	6.4	16.5
9/28/2009	7	22.8	7.8	6.6	16.5
9/28/2009	8	22.8	7.8	6.1	16.6
9/28/2009	9	22.8	7.8	6	16.6
10/22/2009	1	15.3	7.8	8.1	16.7
10/22/2009	2	15.4	7.8	8.2	16.8
10/22/2009	3	15.4	7.8	8	16.8
10/22/2009	4	15.4	7.8	7.9	16.8
10/22/2009	5	15.8	7.8	7.6	17.1
10/22/2009	6	15.8	7.8	7.6	17.1
10/22/2009	7	15.8	7.8	7.7	17.2
10/22/2009	8	15.7	7.8	7.5	17.3
10/22/2009	9	15.7	7.8	8.2	17.5
11/5/2009	1	15.4	8.1	8.8	16.7
11/5/2009	2	15.4	8.1	8.8	16.7
11/5/2009	3	15.4	8	8.8	16.7
11/5/2009	4	15.4	8	8.8	16.7
11/5/2009	5	15.4	8	8.8	16.7
11/5/2009	6	15.4	8	8.7	16.7
11/5/2009	7	15.5	8	8.7	16.8
11/5/2009	8	15.5	8	8.6	16.8
11/5/2009	9	15.5	8	8.6	16.8
1/19/2010	1	3	8.4		12.8
1/19/2010	3	2.7	8.3		13.3
1/19/2010	5	2.7	8.3		13.5
1/19/2010	7	2.2	8.2		14
1/19/2010	9	2.2	8.2		14
1/19/2010	11	2.2	8.2		14
1/19/2010	13	2.2	8.2		14.1
1/19/2010	15	2.1	8.2		14.1
1/19/2010	17	2.1	8.2		14.2
1/19/2010	19	2.1	8.2		14.3
1/19/2010	21	2.1	8.2		14.3
3/9/2010	1	7.4	8.1		9.9
3/9/2010	3	5.6	8.1		11.2
3/9/2010	5	4.8	8		12.6
3/9/2010	7	4.6	8		12.8
3/9/2010	9	4.4	7.9		13.1
3/9/2010	11	4.2	7.9		13.3
3/9/2010	13	4.2	7.9		13.5
3/9/2010	15	4.1	7.9		13.6
3/9/2010	17	4.1	7.9		13.6
3/9/2010	19	4.1	7.8		13.7
3/9/2010	21	4	7.8		13.8
4/13/2010	1	15.6	8.1	10.8	9.6
4/13/2010	2	15.6	8.1	10.7	9.6
4/13/2010	3	15.5	8	10.5	9.7
4/13/2010	4	15	8	10.2	10.3
4/13/2010	5	14.6	7.9	9.7	10.6
4/13/2010	6	13.9	7.7	8.9	11.5
4/13/2010	7	12.6	7.6	8.5	12.5
4/13/2010	8	12.4	7.6	8.4	12.7

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
4/13/2010	9	12.3	7.6	8.5	12.8
4/13/2010	10	12.2	7.6	8.6	12.8
4/13/2010	11	12.3	7.6	8.6	13
5/11/2010	1	18.3	8	9.4	11.2
5/11/2010	2	18.3	8.1	9.5	11.2
5/11/2010	3	18.3	8.1	9.4	11.3
5/11/2010	4	18.3	8.1	9.2	11.3
5/11/2010	5	18.3	8	8.9	11.9
5/11/2010	6	18.4	7.9	8.4	12.1
5/11/2010	7	18.4	7.9	8.4	12.1
5/11/2010	8	18.5	7.9	8.1	12
5/11/2010	9	18.5	7.8	7.8	12.4
5/11/2010	10	18.6	7.8	7.8	12.4
6/8/2010	1	25	8.1	7.7	11.6
6/8/2010	2	25	8.1	7.8	11.5
6/8/2010	3	24.9	8.1	7.6	11.6
6/8/2010	4	24.8	8	7.3	11.6
6/8/2010	5	24.6	7.9	6.8	11.6
6/8/2010	6	24.1	7.5	3.5	13.9
6/8/2010	7	23.1	7.4	3.1	14
6/8/2010	8	23	7.4	2.6	14.9
6/8/2010	9	22.7	7.4	2.5	15
6/8/2010	10	22.5	7.3	2.3	15
6/8/2010	11	22.3	7.3	2.6	15.3
7/13/2010	1	28.1	8.1		14
7/13/2010	3	27.9	7.9		14.1
7/13/2010	5	27.8	7.8		14.1
7/13/2010	7	27.8	7.7		14.2
7/13/2010	9	27.8	7.7		14.3
7/13/2010	11	27.8	7.7		14.3
7/13/2010	13	27.7	7.6		14.3
7/13/2010	15	27.7	7.6		14.4
7/13/2010	21	27.7	7.6		14.4
8/10/2010	1	28.7	8.1	7.5	16.4
8/10/2010	3	28.5	8	6.2	16.6
8/10/2010	5	28.4	8	5.5	16.6
8/10/2010	7	28.2	7.9	4.7	16.7
8/10/2010	9	28.1	7.7	3.4	16.9
8/10/2010	11	27.9	7.7	2.4	17.3
8/10/2010	13	27.8	7.6	1.9	17.4
8/10/2010	15	27.7	7.6	1.6	17.5
8/10/2010	17	27.6	7.5	1.2	17.6
8/10/2010	19	27.5	7.5	1	17.7
8/10/2010	20	27.5	7.5	1	17.7
9/16/2010	1	24.9	8.2	8	18.3
9/16/2010	3	24.7	8.1	6.9	18.5
9/16/2010	5	24.6	8	6.4	18.6
9/16/2010	7	24.7	7.9	5.4	18.7
9/16/2010	9	24.5	7.8	4.6	19.2
9/16/2010	11	24.5	7.8	4.6	19.4
9/16/2010	13	24.3	7.8	4.5	19.6
9/16/2010	15	24.3	7.8	4.5	19.7
9/16/2010	17	24.3	7.8	4.5	19.7
10/13/2010	1	20.4	8.2		17.4
10/13/2010	2	20.4	8.2		17.5
10/13/2010	4	20.2	8.1		17.6
10/13/2010	6	20	7.8		18.4
10/13/2010	8	20	7.9		18.8
10/13/2010	10	20	7.9		18.9
10/13/2010	12	20	7.9		18.9
10/13/2010	14	20	7.9		19
10/13/2010	16	20.1	7.9		19.2
10/13/2010	18	20.1	7.9		19.2
10/13/2010	20	20.1	7.9		19.3
11/9/2010	1	13.6	8	8.9	18
11/9/2010	2	13.6	8	8.9	18.1
11/9/2010	3	13.6	8	8.9	18.1
11/9/2010	4	13.6	8	8.9	18.1
11/9/2010	5	13.6	8	8.9	18.1
11/9/2010	6	13.6	8	8.9	18.1
11/9/2010	7	13.6	8	8.8	18.1
11/9/2010	8	13.6	8	8.8	18.2
11/9/2010	9	13.6	8	8.8	18.2
11/9/2010	10	13.6	8	8.8	18.2
11/9/2010	11	13.6	8	8.8	18.2
11/9/2010	12	13.7	8	8.7	18.2
11/9/2010	13	13.7	8	8.7	18.3
11/9/2010	14	13.7	8	8.7	18.3
11/9/2010	15	13.7	7.9	8.7	18.3
11/9/2010	16	13.7	7.9	8.7	18.3
11/9/2010	17	13.7	7.9	8.7	18.4
11/9/2010	18	13.8	7.9	8.7	18.5
11/9/2010	19	13.8	7.9	8.8	18.5
11/9/2010	20	13.8	7.9	8.8	18.5
12/2/2010	1	11.7	7.5		18.4
12/2/2010	2	11.6	7.5		18.4
12/2/2010	3	11.6	7.5		18.4
12/2/2010	4	11.6	7.5		18.4
12/2/2010	5	11.6	7.5		18.4
12/2/2010	6	11.6	7.5		18.5
12/2/2010	7	11.6	7.5		18.5
12/2/2010	8	11.7	7.5		18.5
12/2/2010	9	11.7	7.4		18.5
12/2/2010	10	11.7	7.4		18.5
12/2/2010	13	11.7	7.4		18.6
2/9/2011	1	3.5	7.5	11.9	15.8
2/9/2011	2	3.4	7.5	12	15.9
2/9/2011	3	3.5	7.5	12	16
2/9/2011	4	3.4	7.5	11.9	16.3
2/9/2011	5	3.3	7.4	11.9	16.3
2/9/2011	6	3.3	7.4	11.8	16.4

Collection Date	Depth (meters)	Temp. (°C)	pH (SU)	Dissolved Oxygen (mg/L)	Salinity (g/kg)
2/9/2011	7	3.3	7.4	11.8	16.4
2/9/2011	8	3.3	7.4	11.8	16.4
2/9/2011	9	3.3	7.4	11.8	16.5
2/9/2011	10	3.3	7.4	11.8	16.7
2/9/2011	11	3.3	7.3	11.8	16.8
2/9/2011	12	3.2	7.3	11.8	17
2/9/2011	13	3.2	7.3	11.8	17.3
2/9/2011	14	3.1	7.2	11.8	17.5
2/9/2011	15	3	7.2	11.7	17.7
2/9/2011	16	2.9	7.1	11.6	17.9
2/9/2011	17	2.9	7	11.6	18
2/9/2011	18	2.9	7	11.6	18
2/9/2011	19	2.9	6.9	11.6	18.1
3/8/2011	1	8.2	7.6	11.3	16
3/8/2011	2	8.1	7.6	11.4	16.1
3/8/2011	3	8	7.6	11.4	16.2
3/8/2011	4	8	7.6	11.2	16.2
3/8/2011	5	8	7.6	11.3	16.3
3/8/2011	6	8	7.5	11.2	16.5
3/8/2011	7	8	7.5	11.2	16.5
3/8/2011	8	7.9	7.5	11.1	16.8
3/8/2011	9	7.8	7.5	11.1	17
3/8/2011	10	7.8	7.4	11.1	17
3/8/2011	11	7.8	7.4	11.1	17.1
3/8/2011	12	7.8	7.3	11.1	17.1
3/8/2011	13	7.8	7.3	11.1	17.1
3/8/2011	14	7.7	7.2	11.1	17.2
3/8/2011	15	7.6	7.1	11.1	17.3
3/8/2011	16	7.6	6.9	11.2	17.3
90th Percentile		27.0	8.2		
10th Percentile		5.4	7.4		
Average					16.15

Attachment C

Flow Frequency Memo and 303(d) Fact Sheets

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Regional Office
4949-A Cox Road Glen Allen, Virginia 23060

SUBJECT: Flow Frequency Determination / 303(d) Status
Windmill Point Resort &Yacht Harbor – VA0060569

TO: Jeremy Kazio

FROM: Jennifer Palmore, P.G.

DATE: April 19, 2011

COPIES: File

The Windmill Point Resort & Yacht Harbor's wastewater treatment plant discharges to the Windmill Point Boat Basin, an unnamed tributary of the Rappahannock River, on Fleets Island in Lancaster County. The outfall is located at rivermile 3-XEV000.04. Flow frequencies have been requested at this site for use in developing effluent limitations for the VPDES permit.

The boat basin is tidally influenced. Flow frequencies cannot be determined for tidally affected streams, therefore the previously recommended dilution ratios should be used. The discharge is located within the estuarine zone of the Rappahannock River; therefore the saltwater criteria should be applied.

During the 2010 305(b)/303(d) Water Quality Assessment, the boat basin was considered a Category 5A water ("A Water Quality Standard is not attained. The water is impaired or threatened for one or more designated uses by a pollutant(s) and requires a TMDL (303d list)." The applicable fact sheet is attached. The Aquatic Life Use is impaired due to low dissolved oxygen in the Rappahannock River mesohaline estuary (RPPMH). The Recreation-, Fish Consumption-, and Wildlife Uses are not assessed. The boat basin is under a VDH Shellfish Prohibition, therefore the Shellfish Use is considered to be removed.

The Windmill Point Resort was included in the Chesapeake Bay TMDL, which was approved by the EPA on 12/29/2010. The facility was included in the aggregated total nitrogen, total phosphorus, and total suspended solids wasteload allocations for nonsignificant wastewater dischargers in the Corrotoman River mesohaline estuary (CRRMH). This was an error as the facility is actually located in RPPMH. The permit may be reissued and the location will be corrected later in the TMDL (Fred Cunningham, 4/13/11).

Due to the limited mixing in the boat basin, the receiving stream has been considered a Tier 1 water.

Water quality monitoring data is attached. Data from station 3-RPP010.60 was chosen to characterize the Rappahannock River at the boat basin. The station is located on the Rappahannock River at Orchard Point, which is approximately 10.4 miles upstream of the facility.

If you have any questions concerning this analysis, please let me know.

2010 Fact Sheets for 303(d) Waters

RIVER BASIN: Rappahannock River Basin **HYDROLOGIC UNIT:** 02080104

STREAM NAME: **Rappahannock River**

TMDL ID: **RPPMH-DO-BAY** **2010 IMPAIRED AREA ID:** CB-RPPMH

ASSESSMENT CATEGORY: 5A **TMDL DUE DATE:** 2010

IMPAIRED SIZE: 123.53 - Sq. Mi. **Watershed:** VAP-E22E

INITIAL LISTING: 1998

UPSTREAM LIMIT: Mesohaline boundary

DOWNSTREAM LIMIT: Mouth at Chesapeake Bay

The mesohaline Rappahannock River and tidal tributaries.

CLEAN WATER ACT GOAL AND USE SUPPORT:

Aquatic Life Use - Not Supporting, Open Water Subuse - Not Supporting, Deep Water Subuse - Not Supporting, Deep Channel Use - Fully Supporting

IMPAIRMENT: Dissolved Oxygen

The mainstem of the Rappahannock River from Myrtle Swamp to its mouth was originally listed in 1998 by DEQ due to dissolved oxygen exceedances and nutrient overenrichment. The EPA extended the segment upstream to the confluence with Totuskey Creek. In the 2004 cycle dissolved oxygen exceedances were noted in deepwater and deep channel stations downstream of the confluence with Lancaster Creek (Morattico), which is further downstream.

The new Chesapeake Bay Water Quality Standards were implemented during the 2006 cycle. The mesohaline portion of the Rappahannock fails the Open Water Subuse's summer 30-day dissolved oxygen criteria and applicable areas fail the Deep Water 30-day dissolved oxygen criteria. During the 2008 cycle, the Deep Channel Subuse's instantaneous minimum dissolved oxygen criteria was violated, however the segment met the use during the 2010 cycle and will be delisted. The Open Water Subuse's 30-day rest-of-year standard was met and there was insufficient data to assess the other dissolved oxygen criteria.

IMPAIRMENT SOURCE: Point Source, Nonpoint Source

Tributary strategy has been developed.

RECOMMENDATION: Problem Characterization

Attachment D

Site Inspection Report

Horne, Heather (DEQ)

From: Horne, Heather (DEQ)
Sent: Wednesday, November 09, 2011 5:45 PM
To: ray@rayancey.com
Cc: 'Kent Cuthbertson'; Scott W. Miller; 'Longandassoc@aol.com'; 'criedlinger@resourceintl.com'
Subject: Windmill Point Inspection Report VA0060569
Attachments: VA0060569-recon-12.pdf

Hello Mr. Yancey-

Attached is the report from the reconnaissance inspection conducted at Windmill Point WWTP on 10/13/11. There are two "Request for Action" items listed in the report. The first is to keep DEQ updated on efforts and repairs at the plant. The other is to provide some kind of support or anchoring for the influent pipe in the primary cell.

If you have any questions about the inspection or report, please feel free to contact me.

Thanks,

Heather Horne
Water Compliance Inspector
Virginia Department of Environmental Quality
Piedmont Regional Office
Note new e-mail address: heather.horne@deq.virginia.gov
4949-A Cox Road
Glen Allen, VA 23060
Phone: 804-527-5064
Fax: 804-527-5106

Virginia Department of Environmental Quality

INSPECTION REPORT- FOLLOW UP

Recon

FACILITY NAME: Windmill Point Resort and Yacht Harbor, Inc.	**INSPECTION DATE:**	October 13, 2011	
	INSPECTOR	Heather Horne and Meredith Williams hah 11.3.11	
PERMIT No.: VA0060569	**REPORT DATE:**	November 3, 2011	
TYPE OF FACILITY: ☐ Municipal ☐ Major ☐ Industrial ☐ Minor ☐ Federal ☑ Small Minor ☐ HP ☐ LP	**TIME OF INSPECTION:**	0946 Arrival	1035 Departure
	TOTAL TIME SPENT (including prep & travel)	16 hours	
PHOTOGRAPHS: ☑ Yes ☐ No	**UNANNOUNCED INSPECTION?** ☐ Yes ☑ No		
REVIEWED BY / Date: MRW 11/7/11 KW 11/8/11			
PRESENT DURING INSPECTION: K. Cuthbertson, Contract Operator; George Canada Windmill Point Maintenance; Charlie Riedlinger, Resource International			

Request for Action (7/1/11 Inspection)	**Report Response (Received 9/12/11)**	**Action Taken: (As of 10/13/11 Inspection)**
1. Vegetation surrounding the interior and exterior berms must be better controlled. Vegetative roots can cause berm failure. Tall vegetation reduces wind action across the lagoon surface and provides habitat for burrowing rodents.	Mr. Jett, Windmill Point Maintenance Supervisor, intensified his efforts to not only remove the vegetation growing along the waterline in both cells but he has also removed most of the large rafting plants floating in Cell One. We intend to remove all of the unwanted vegetation in order to facilitate daily inspections and insure cell wall integrity.	Mr. Jett is no longer employed by Windmill Point. The majority of floating reedy vegetation and vegetative growth on interior berms noted during the 7/1/11 inspection has been removed. Woody vegetation was still noted on the northern exterior berms of both lagoons. Mr. Canada agreed that he would work on removing this vegetation.
2. Grease accumulation must be eliminated prior to discharge. The facility should interview the restaurant in order to make a determination about the grease trap. The facility may also want to evaluate grease accumulation in the pump stations.	Once we were able to initiate the discharge we did not see any more grease throughout the month of July and have not had any grease in the plant to date. The Tikki Bar and Restaurant does not have a grease trap. They do have their grease removed by a commercial protein company. We inspected all of the lift stations and found no signs of grease. To date we cannot determine where the grease came from that was evident during the inspection. Mr. Jett conducts twice daily inspections of the lift stations for both alarm testing and grease accumulation. If grease does appear, we will know right away and determine a corrective course of action.	There was no visible grease at the plant on the day of inspection. Mr. Canada is now monitoring pump stations daily.

VA DEQ Inspection Report Follow-up

Permit #	VA0060569

Request for Action (7/1/11 Inspection)	Report Response (Received 9/12/11)	Action Taken: (As of 10/13/11 Inspection)
3. The diffusers and aeration lines must be properly repaired in order to provide adequate aeration to the lagoons.	The facility met with White Oak Electrical who has been contracted to inspect the condition and type of all diffusers in Cell 1 and determine what aeration is in Cell 2. This work is scheduled-for August 29, 2011. The facility will then schedule to have necessary repairs made to the diffusers as well as the manifold controls currently laying on the berm of Cell 1.	White Oak Electrical has been onsite to evaluate diffusers. Problems were found with the diffusers and manifolds. Repairs have not been completed. The facility plans to repair and raise manifolds.
4. The discharge structure between Cells 1 and 2 must be restored to meet O&M manual requirements or the O&M manual must be revised and submitted with your inspection report response for DEQ approval. The facility should consider further researching the original design of the discharge structure for optimal operation.	We concur that the discharge structure should be repaired and/or restored. We are working with Bay Design Group, Inc. to locate any original plans and drawings that will provide details to accomplish this corrective action. We request that we be given at least 30 days to obtain relevant original design information. Northern Neck Mechanical, Inc. has been contracted to make temporary repairs to broken piping.	The facility has been discharging for three consecutive months because the flow cannot be ceased between Cell 1 and Cell 2. Lagoon levels are the lowest ever seen by inspectors (Freeboard: 8 feet Cell 1; 4 feet Cell 2). The facility has figured out the original construction of the chimney and has plans to make repairs. Northern Neck Mechanical is supposed to do work.
5. The discharge valve from the secondary lagoon must be repaired or replaced.	Northern Neck Mechanical, Inc. has been contracted to replace the valve with a new identical valve. This work will be completed in September 2011.	This had not been completed at the time of inspection.
6. The VPDES permit states that in order to achieve adequate chlorination, water discharged at the end of the chlorine contact tank, must at all times be greater than 0.6 mg/L. The sample collected by the operator at the time of inspection was 0.3 mg/L. This has also been reflected in enterococci excursions on submitted DMR data. Although on the day of inspection, this water did not discharge to the receiving stream due to the line blockage, operators should ensure that adequate chlorination can be achieved at all times. In your response to this report, please provide information about how adequate chlorination can be ensured at all times (i.e. tank cleaning, adjusting chlorination tablet feeder, flow, etc.)	The effluent discharge valve is the biggest problem we have with obtaining consistently adequate chlorination. The valve sticks, is difficult to open, and the flow is even more difficult to adjust. Replacing the valve ... will allow flow to be properly sized to the number of chlorine tablet stacks in use. Historically, two chlorine tablet stacks were sufficient to achieve acceptable total residual chlorine. The discharge valve has caused us to move to four chlorine tablet stacks since the flow is so low. That will be corrected when the valve is replaced. The chlorine contact tanks will be cleaned when the new valve is installed and the discharge point is moved. We are confident that we will be able to sustain adequate disinfection and meet permit requirements when this work is complete.	This work has not yet been completed. The contract operator reported the facility has so far been able to meet chlorine limits.

VA DEQ Inspection Report Follow-up

Permit #	VA0060569

Request for Action (7/1/11 Inspection)	Report Response (Received 9/12/11)	Action Taken: (As of 10/13/11 Inspection)
7. The plant must be operated so a discharge can occur before the lagoons or other operational units overflow. The time needed to dig or blow out the discharge pipe in order to initiate a discharge is not an adequate standard operating procedure. Please provide a plan, including an estimated completion date on how this can be corrected.	A request to move the effluent discharge line was submitted to our DEQ permit writer, Mr. Jeremy Kazio, at the beginning of this month. The concept was approved last week and the requirement for design was immediately passed to our engineer. We are waiting for the plans to be completed. Once approved by DEQ, we are prepared to complete the modification. We expect this to be completed in September 2011.	At the time of inspection, water was backed up to the v-notch weir, but was still discharging. Resource International has submitted a proposal for moving the discharge pipe. This has not yet been completed.

INSPECTION OVERVIEW AND CONDITION OF TREATMENT UNITS

Lagoons: Both lagoons were covered with duckweed at the time of inspection. Overall, vegetation control on the berms has improved.
The primary lagoon 8 inch PVC influent pipe is now visible. When the lift station pumps down, inspectors heard a bubbling noise and witnessed the pipe moving in the water. There are concerns the influent pipe will break off in the lagoon berm if it is not properly anchored.

Chlorination/Dechlorination: Both of these units were operable all four tubes stocked. The tanks still need to be cleaned.

Discharge: There was a very high tide at the time of inspection. The discharge pipe was submerged in the receiving stream and difficult to view. Negative environmental impacts were not observed.

EFFLUENT FIELD DATA: N/A

Flow	MGD	**Dissolved Oxygen**	mg/L	**TRC (Contact Tank)**	mg/L
pH	S.U.	**Temperature**	°C	**TRC (Final Effluent)**	mg/L

Was a Sampling Inspection conducted? ☐ Yes (see Sampling Inspection Report) ☑ No

CONDITION OF OUTFALL AND EFFLUENT CHARACTERISTICS:

1. Type of outfall: ☐ Shore based ☑ Submerged Diffuser? ☐ Yes ☑ No
2. Are the outfall and supporting structures in good condition? ☑ Yes ☐ No
3. Final Effluent (evidence of following problems): NONE
   ☐ Sludge bar ☐ Grease ☐ Turbid effluent ☐ Visible foam ☐ Unusual color ☐ Oil sheen
4. Is there a visible effluent plume in the receiving stream?
   ☐ Yes ☑ No
5. Receiving stream:
   ☑ No observed problems ☐ Indication of problems (explain below)

VA DEQ Inspection Report Follow-up

Permit #	VA0060569

REQUEST for ACTION:

1. Continue with plans for repairs. Please continue to keep DEQ abreast of these plans and timelines.
2. Please indicate plans for anchoring the influent pipe in Cell 1.

Digital Photos Taken: 10/13/11

Photograph 1: Primary lagoon

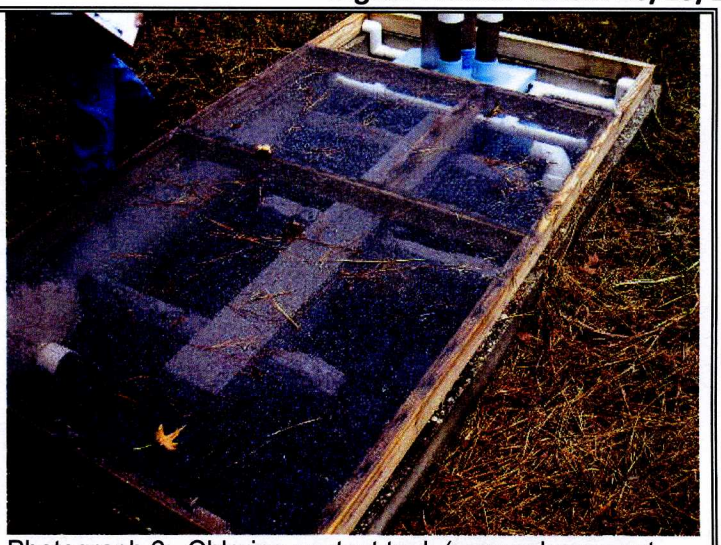
Photograph 2: Influent pipe in primary cell

Photograph 3: Discharge chimney from Cell 1 to Cell 2

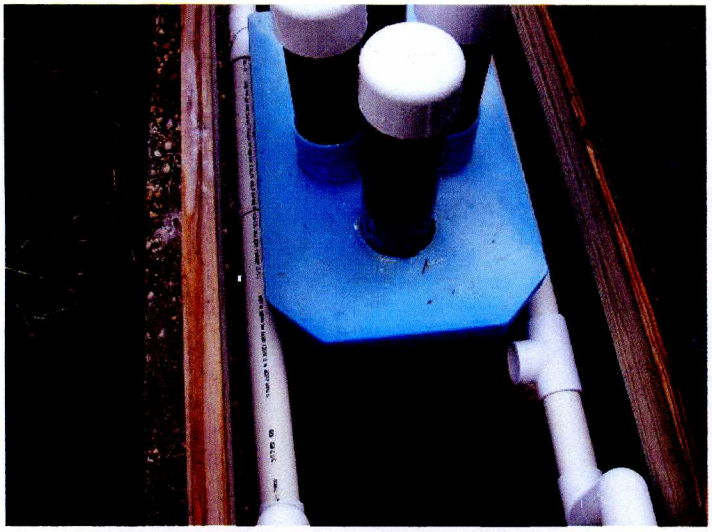
Photograph 4: Secondary cell (one diffuser)

Digital Photos Taken: 10/13/11

Photograph 5: Secondary cell overview

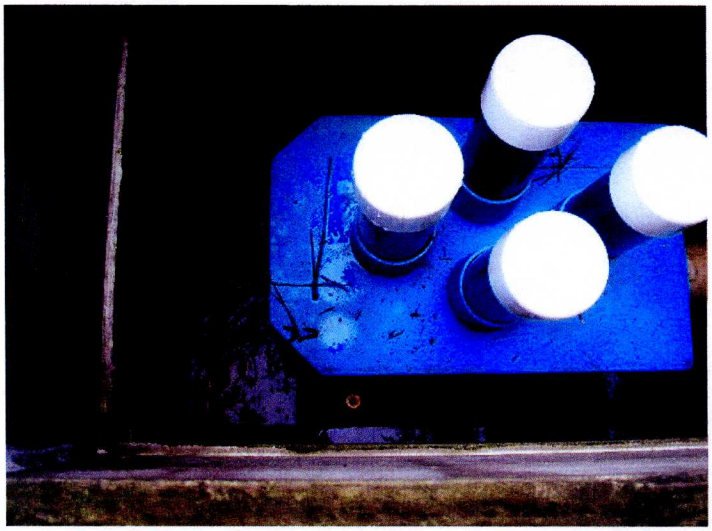


Photograph 6: Chlorine contact tank (screen keeps out leaves and other debris)



Photograph 7: Chlorinator

Photograph 8: Discharge valve in secondary cell



Photograph 9: Dechlorination tablet feeder

Photograph 10: Submerged discharge pipe

Attachment E

Stream Sanitation Analyses

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Water Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296 804/527-5020

SUBJECT: **Stream Sanitation Analysis – Windmill Point Boat Basin**
Windmill Point Resort & Yacht Harbor STP (VA0060569)

TO: **Denise Mosca**

FROM: **Jennifer V. Palmore**

DATE: **December 1, 2005 (Revised)**

COPIES: **Model File**

A request for a stream sanitation analysis for the Windmill Point Resort was received on April 27, 2005. The plant is currently permitted at a design flow of 0.03 MGD, and the facility has requested a plant expansion up to a design flow of 0.04 MGD with a second tier expansion of 0.08 MGD. The current permit includes limits of 30 mg/L BOD_5 and 30 mg/L Total Suspended Solids and uses the default mixing ratios of 50:1 for chronic toxicity and 2:1 for acute toxicity.

Background

The permit limits for the facility were reanalyzed by Jon van Soestbergen during the last permit reissuance (see attached memorandum, J. van Soestbergen, October 12, 2000). The facility discharges to the Windmill Point boat basin, a tributary near the mouth of the Rappahannock River. The boat basin is described as a "J" configuration with a narrow channel connecting it to the Rappahannock River and is considered poorly flushed. The 2000 memorandum and a previous 1980 memorandum (Dale Phillips, December 5, 1980) indicate that because of the unusual shape and characteristics of the basin, the Windmill Point boat basin is not appropriate for modeling using the models "A Model of Tidal Flushing for Small Coastal Basins", TPWQM-VPDES, or CORMIX. The 1980 memorandum also explains that although the boat basin is poorly flushed, the Virginia Department of Health preferred to maintain the discharge within the boat basin because it provides increased retention time and treatment for the discharge before it reaches the river. The memorandum proceeds to make a recommendation for relocation of the outfall to the current discharge location within the boat basin.

Recommendations

I have conferred with Allan Brockenbrough in DEQ-Office of Water Permit Support, and we both concur with Jon van Soestbergen's previous determination that the discharge is unmodelable using the above-mentioned models. At this time, we recommend that the current limits for biochemical oxygen demand and total suspended solids be maintained for the proposed expansion. In addition, I recommend that a minimum dissolved oxygen limit of 5.0 mg/L be added to the permit. It is also recommended that due to the low flushing characteristics of the basin, a ratio of 10:1 for chronic toxicity and 2:1 for acute toxicity be used.

Please note that Windmill Point is located in the Chesapeake Bay watershed. The facility will be required to offset any nutrient loading increase and maintain loadings at the levels of the current permit.

If you have any questions or need any additional information, please do not hesitate to contact me.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Water Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296 804/527-5020

SUBJECT: **Stream Sanitation Analysis – Windmill Point Boat Basin**
Windmill Point Resort & Yacht Harbor STP (VA0060569)

TO: **Denise Mosca**

FROM: **Jennifer V. Palmore**

DATE: **November 10, 2005**

COPIES: **Curt Linderman, Mark Alling, Model File**

A request for a stream sanitation analysis for the Windmill Point Resort was received on April 27, 2005. The plant is currently permitted at a design flow of 0.03 MGD, and the facility has requested a plant expansion up to a design flow of 0.04 MGD with a second tier expansion of 0.08 MGD. The current permit includes limits of 30 mg/L BOD_5 and 30 mg/L Total Suspended Solids and uses the default mixing ratios of 50:1 for chronic toxicity and 2:1 for acute toxicity.

Background

The permit limits for the facility were reanalyzed by Jon van Soestbergen during the last permit reissuance (see attached memorandum, J. van Soestbergen, October 12, 2000). The facility discharges to the Windmill Point boat basin, a tributary near the mouth of the Rappahannock River. The boat basin is described as a "J" configuration with a narrow channel connecting it to the Rappahannock River and is considered poorly flushed. The 2000 memorandum and a previous 1980 memorandum (Dale Phillips, December 5, 1980) indicate that because of the unusual shape and characteristics of the basin, the Windmill Point boat basin is not appropriate for modeling using the models "A Model of Tidal Flushing for Small Coastal Basins", TPWQM-VPDES, or CORMIX. The 1980 memorandum also explains that although the boat basin is poorly flushed, the Virginia Department of Health preferred to maintain the discharge within the boat basin because it provides increased retention time and treatment for the discharge before it reaches the river. The memorandum proceeds to make a recommendation for relocation of the outfall to the current discharge location within the boat basin.

Recommendations

I have conferred with Allan Brockenbrough in DEQ-Office of Water Permit Support, and we both concur with Jon van Soestbergen's previous determination that the discharge is unmodelable using the above-mentioned models. At this time, we recommend that the current limits for biochemical oxygen demand and total suspended solids be maintained for the proposed expansion. It is also recommended that due to the low flushing characteristics of the basin, a ratio of 10:1 for chronic toxicity and 2:1 for acute toxicity be used.

Please note that Windmill Point is located in the Chesapeake Bay watershed. The facility will be required to offset any nutrient loading increase and maintain loadings at the levels of the current permit.

If you have any questions or need any additional information, please do not hesitate to contact me.

Palmore,Jennifer

From: Brockenbrough,Allan
Sent: Tuesday, November 08, 2005 9:47 AM
To: Palmore,Jennifer
Cc: Mosca,Denise
Subject: FW: Windmill Point

Jennifer-

The memo looks fine for the conventional pollutants and toxics.

Denise, the nutrient limits should be as follows:

Windmill Point Nutrient Limits				
	Total P		Total N	
Flow	Concentration (mg/l)*	Load (kg/yr)	Concentration (mg/l)*	Load (kg/yr)
0.03	NA	NA	NA	NA
0.04	1.0	104	8.0	783
0.08	1.0	104	8.0	783

* yearly average

See GM05-2009 for the format for the limits. Note that they are required to install BNR at a minimum. At the 0.08 MGD design flow, they would have to put out 0.94 mg/l TP and 7.09 mg/l TN to meet the yearly load limit. However, the technology reg does not require that they install more than BNR – they could install a more advanced treatment system or buy credits to make up the small difference if need be. I'm presuming that we don't know what technology they will install at this point. In the future, the limits can be modified to match the technology actually installed.

Give me a call if you have any questions.

Thanks,

Allan

Allan Brockenbrough, II, P.E.
DEQ - Office of Water Permit Programs
PO Box 10009
Richmond, VA 23240
(804) 698-4147
(804) 698-4032 (fax)

-----Original Message-----
From: Palmore,Jennifer
Sent: Thursday, October 27, 2005 11:07 AM
To: Brockenbrough,Allan
Subject: FW: Windmill Point

Have you had a chance to look at this? If you already commented, forgive me. I can't find any record.

Thanks.

Jennifer Palmore

-----Original Message-----
From: Palmore,Jennifer
Sent: Wednesday, August 10, 2005 8:16 AM
To: Brockenbrough,Allan
Subject: Windmill Point

I have attached a draft memo regarding the Windmill Point marina. As we discussed, please let me know any changes you would like to make. You should have the attachments that I refer to, but if not let me know and I can fax them to you.

Thanks!

Jennifer V. Palmore
Senior Water Planner
Dept. of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
(804) 527-5058
(804) 527-5106 (fax)

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Piedmont Water Regional Office

4949-A Cox Road, Glen Allen, VA 23060-6296 804/527-5020

SUBJECT: **Stream Sanitation Analysis – Windmill Point Boat Basin**
Windmill Point Resort & Yacht Harbor STP (VA0060569)

TO: **Denise Mosca**

FROM: **Jennifer V. Palmore**

DATE: **August 9, 2005**

COPIES: **Curt Linderman, Mark Alling, Model File**

A request for a stream sanitation analysis for the Windmill Point Resort was received on April 27, 2005. The plant is currently permitted at a design flow of 0.03 MGD, and the facility has requested a plant expansion up to a design flow of 0.04 MGD with a second tier expansion of 0.08 MGD. The current permit includes limits of 30 mg/L BOD_5 and 30 mg/L Total Suspended Solids and uses the default mixing ratios of 50:1 for chronic toxicity and 2:1 for acute toxicity.

Background

The permit limits for the facility were reanalyzed by Jon van Soestbergen during the last permit reissuance (see attached memorandum, J. van Soestbergen, October 12, 2000). The facility discharges to the Windmill Point boat basin, a tributary near the mouth of the Rappahannock River. The boat basin is described as a "J" configuration with a narrow channel connecting it to the Rappahannock River and is considered poorly flushed. The 2000 memorandum and a previous 1980 memorandum (Dale Phillips, December 5, 1980) indicate that because of the unusual shape and characteristics of the basin, the Windmill Point boat basin is not appropriate for modeling using the models "A Model of Tidal Flushing for Small Coastal Basins", TPWQM-VPDES, or CORMIX. The 1980 memorandum also explains that although the boat basin is poorly flushed, the Virginia Department of Health preferred to maintain the discharge within the boat basin because it provides increased retention time and treatment for the discharge before it reaches the river. The memorandum proceeds to make a recommendation for relocation of the outfall to the current discharge location within the boat basin.

Recommendations

I have conferred with Allan Brockenbrough in DEQ-Office of Water Permit Support, and we both concur with Jon van Soestbergen's previous determination that the discharge is unmodelable using the above-mentioned models. At this time, we recommend that the current limits for biochemical oxygen demand and total suspended solids be maintained for the proposed expansion. It is also recommended that due to the low flushing characteristics of the basin, a ratio of 10:1 for chronic toxicity and 2:1 for acute toxicity be used.

Please note that Windmill Point is located in the Chesapeake Bay watershed. The facility will be required to offset any nutrient loading increase and maintain loadings at the levels of the current permit.

If you have any questions or need any additional information, please do not hesitate to contact me.

Palmore,Jennifer

From: Palmore,Jennifer
Sent: Tuesday, May 03, 2005 4:19 PM
To: Brockenbrough,Allan
Subject: Windmill Point

Denise Mosca gave me a copy of the application package for this facility. They are applying for a tiered increase for their flow limits (0.03 MGD – current, 0.04 MGD, 0.08 MGD). The latest modeling effort was by Jon in 10/2000, where he says the receiving stream (a boat basin) is unmodelable using the Tidal Prism Model and recommends 30/30 limits. He goes on to recommend default dilution ratios b/c he does not feel that CORMIX adequately characterizes the situation.

I sent you a copy of the package. I figured we could talk about it and take care of the CORMIX and conventionals at the same time if we are both in agreement. My first reaction is to keep their BPJ limits as is and (possibly) require monitoring in the boat basin for a permit cycle if we are concerned about water quality issues. Even though the discharge is into a small boat basin with very little flushing, according to the file there are advantages to keeping the effluent contained in the basin b/c it limits the size of the shellfish condemnation. In addition, the upcoming nutrients requirement will affect them when they expand.

Anyway, I thought if you want you can give me a call when you get it. If we both agree, I would be happy to write up the memo (for your review of course). I know you must have a lot on your plate.

Talk to you soon.

Jennifer V. Palmore
Senior Water Planner
Dept. of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
(804) 527-5058
(804) 527-5106 (fax)

BAY design group
Engineering, Surveying & Land Planning

March 18, 2005

Ms. Denise M. Mosca
Environmental Specialist II
Department of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, Va. 23060

Re: Reissuance of VPDES Permit No. VA 0060569
Windmill Point Resort & Yacht Harbor, Inc.

Dear Ms. Mosca

The original and three copies of the application are attached. The Owner wishes to file for an increase in capacity and to change the method of treatment. The new first tier would be for a discharge of 40,000 GPD with a second tier of 80,000 GPD. The method of treatment will change from a discharging lagoon to an advanced treatment process with discharge at the same point. Please copy me on all correspondence concerning the existing treatment plant and this application.

Please call me with any questions. I can be reached at 550-4855 (0) or 310-5280 (cell).

Sincerely,

Kenneth L. Barnes

Kenneth L. Barnes, P.E.
Bay Design Group, P.C.

c: VDH-East Central Field Office-Turner Road

C:\WINDMILL POINT\DEQ Mosca.wpd

9415-A Atlee Commerce Blvd.
Ashland, VA 23005
804-550-4855
Fax: 804-550-4857
www.baydesigngroup.com

Windmill Point
VA0060569
Attach No. 5

Memorandum

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Office of Water Permits Support — 9th Floor, 629 East Main Street, Richmond, VA

SUBJECT: Windmill Point Marine Resort (VA0060569)
Receiving Stream Analysis

TO: Denise Mosca, KRO

FROM: Jon van Soestbergen

DATE: October 12, 2000

COPIES: M. Dale Phillips

Introduction

The subject facility has applied for reissaunce of its VPDES discharge permit with a permitted flow of 0.030 MGD. As a result, an analysis was performed in an effort to determine appropriate effluent limits and dilution ratios applicable to this discharge and receiving waterbody.

The permit writer provided historical documentation including the SWCB memorandum "Rationale for Windmill Point Permit Limits", J.D. Taft, December 5, 1980, and a plan for a subsurface effluent diffuser installed as part of flow expansion in 1980. Additionally, a site visit was performed by the author and the permit writer on September 26, 2000, joined on site by the facility owner and treatment plant operator. Based on a review of the information contained in the historical documentation provided, the site visit, and an evaluation of modeling tools utilized by DEQ, I offer the following conclusions and recommendations.

Discharge

The subject discharge is to a marina boat basin located approximately at the mouth of the Rappahannock River at its confluence with the Chesapeake Bay. The treatment facility is an aerated lagoon system that serves a resort conference center and hotel, several condominiums and single family homes, and marine pump-out facilities. Although most of the condominiums and single family homes are limited to seasonal use, at least one condominium and one home serve as permanent residences.

Both the owner and the operator stated that the discharge pipe is located approximately as shown on the plan provided as part of the historical documentation. The plans show that the effluent pipe terminates in a four inch "T" connection approximately 18 inches above the bottom of the boat basin. This "T" connection serves as a 2-port effluent diffuser. Discharge flow is gravity fed, controlled by the difference in head between the lagoon and the water surface elevation in the boat basin.

Receiving Waterbody

The configuration of the boat basin is approximately the form of a backward "J", with a single channel connecting the basin to the Rappahannock River. Mean water depth in the basin is approximately 7 feet and tidal fluctuation is approximately 1.5 to 2 feet. The owner stated that the tidal velocity through the channel approaches about 5 knots at its peak. The 1980 memorandum indicates a field study was performed to determine tidal ranges in and flushing characteristics of the basin. Results indicated that the basin exhibited poor flushing characteristics.

Modeling

In 1980 an attempt to apply the model "A Model of Tidal Flushing for Small Coastal Basin" (A.Y. Kuo - VIMS) was made, but in the opinion of the author of the 1980 memorandum the marina basin could not be adequately described by the model because of its restricted mouth and unusual configuration. The 1980 memorandum therefore recommended relocation of the outfall to its present location and permit limits of 30/30 (BOD_5/TSS) at a design flow of 0.030 MGD.

No attempt was made in the current analysis to prepare a model to be used for determining permit limits for conventional parameters. Based on the site visit and review of the previous work, I concur with the conclusion that the marina could not be adequately described by the 1980 model. I further believe that the "TPWQM-VPDES" model used by DEQ for modeling point source discharges in small coastal basins in Virginia would not adequately describe the boat basin using available data.

The DEQ Guidance Memo No. 00-2011, "Guidance on Preparing VPDES Permit Limits" and the expert modeling system CORMIX were reviewed to determine the applicability of this system in analyzing the mixing zone for evaluation of effluent limits for toxic parameters. Guidance Memo No. 00-2011 recommends that analysis of the initial mixing plume be performed where a subsurface diffuser is used and where a well developed plume exists. The CORMIX expert system can effectively simulate an effluent plume from single port or multiple port diffusers to receiving waterbodies with various physical configurations and hydraulic flow regimes.

Results

It is the professional judgment of the author that the following apply to the Windmill Point Marina boat basin:

1. The critical flow regime for analysis of effluent impact on water quality in the basin occurs at and immediately after low slack tide, when there is either no tidal current in the basin or a slight incoming current. Because of the single outlet configuration of the boat basin, during this flow regime there will be no well-developed effluent plume from the discharge.

2. Although the installed diffuser effectively splits the flow into two directions, the configuration does not lend itself to straightforward analysis using CORMIX. The applicable routine is CORMIX2, which analyzes a submerged multiport diffuser discharge. However, the minimum number of ports for CORMIX2 is 3, whereas the installed diffuser effectively has 2 ports on a single riser. Additionally, the single outlet configuration of the boat basin and diffuser location within the basin do not clearly fit any hydraulic regime simulated by CORMIX.

Although these limitations do not preclude modeling of the Windmill Point Marina boat basin and the discharge, it is my opinion that desktop CORMIX modeling without performing field studies to effectively calibrate and verify the results of the model would not produce reliable and technically defensible results. Therefore, CORMIX was not applied to this situation.

Recommendations

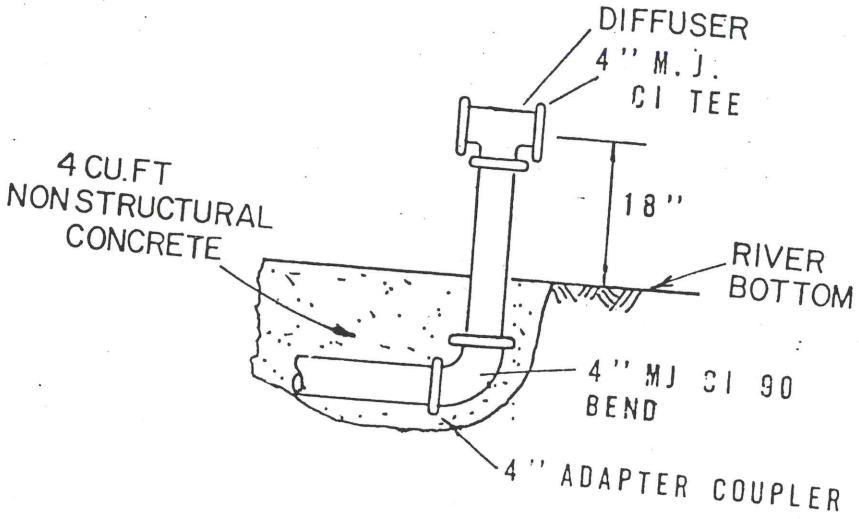
For biochemical oxygen demand, it is recommended that, consistent with previous actions for this VPDES permit, effluent limitations consistent with present limitations be incorporated into the permit (30 mg/l BOD_5 at a design flow of 0.030 MGD).

It is recommended that, consistent with the recommendations of Guidance Memo No. 00-2011, the present mixing zone standard not be implemented and the default values of 50:1 for chronic and 2:1 for acute toxicity be used for this discharge.

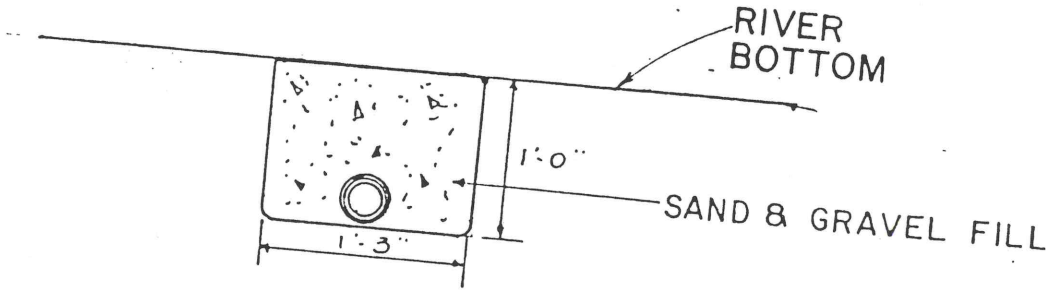
If you have any questions or require additional information, please do not hesitate to contact me at (804) 698-4117.

(TYP.)

AIN



EFFLUENT DIFFUSER
NTS



PIPE

SUBAQUEOUS INSTALLATION DETAIL
NTS

CTURE

NOTE: EACH LENGTH OF PIPE TO HAVE LEAD COLLAR OR OTHER CORROSION RESISTANT DEADWEIGHT AT EACH THIRD POINT. EACH COLLAR TO WEIGH 50 POUNDS.

E
A

BWCM
(D. PHILLIPS)

COMMONWEALTH of VIRGINIA

STATE WATER CONTROL BOARD
2111 Hamilton Street

R. V. Davis
Executive Secretary

Post Office Box 11143
Richmond, Virginia 23230
(804) 257-0056

Please reply to: Tidewater Regional Office
287 Pembroke Office Park
Suite 310 Pembroke No. 2
Virginia Beach, Virginia 23462
804/499-8742

December 22, 1980

Mr. Karl Kohler
301 Maple Avenue, West
Vienna, Virginia 22180

Dear Mr. Kohler:

This is in reference to the permit amendment for the Windmill Point Marine Resort, Inc. I would like to confirm in writing, my recent telephone conversation with you, in which the discharge point was discussed. It is requested that the specific discharge location within the basin be relocated from its present site to the main part of the basin. In addition, some diffuser sections at the end of the pipe should be included.

The intent of these requirements is to enhance the limited flushing characteristics of the basin. The specific point of discharge should be somewhere within the area shown on the attached drawing. As I indicated in our telephone conversation this office may be able to offer some technical assistance with respect to the construction techniques involved in the discharge pipe relocation.

Thank you for your cooperation in this matter. Please don't hesitate to contact me if you have any questions or comments.

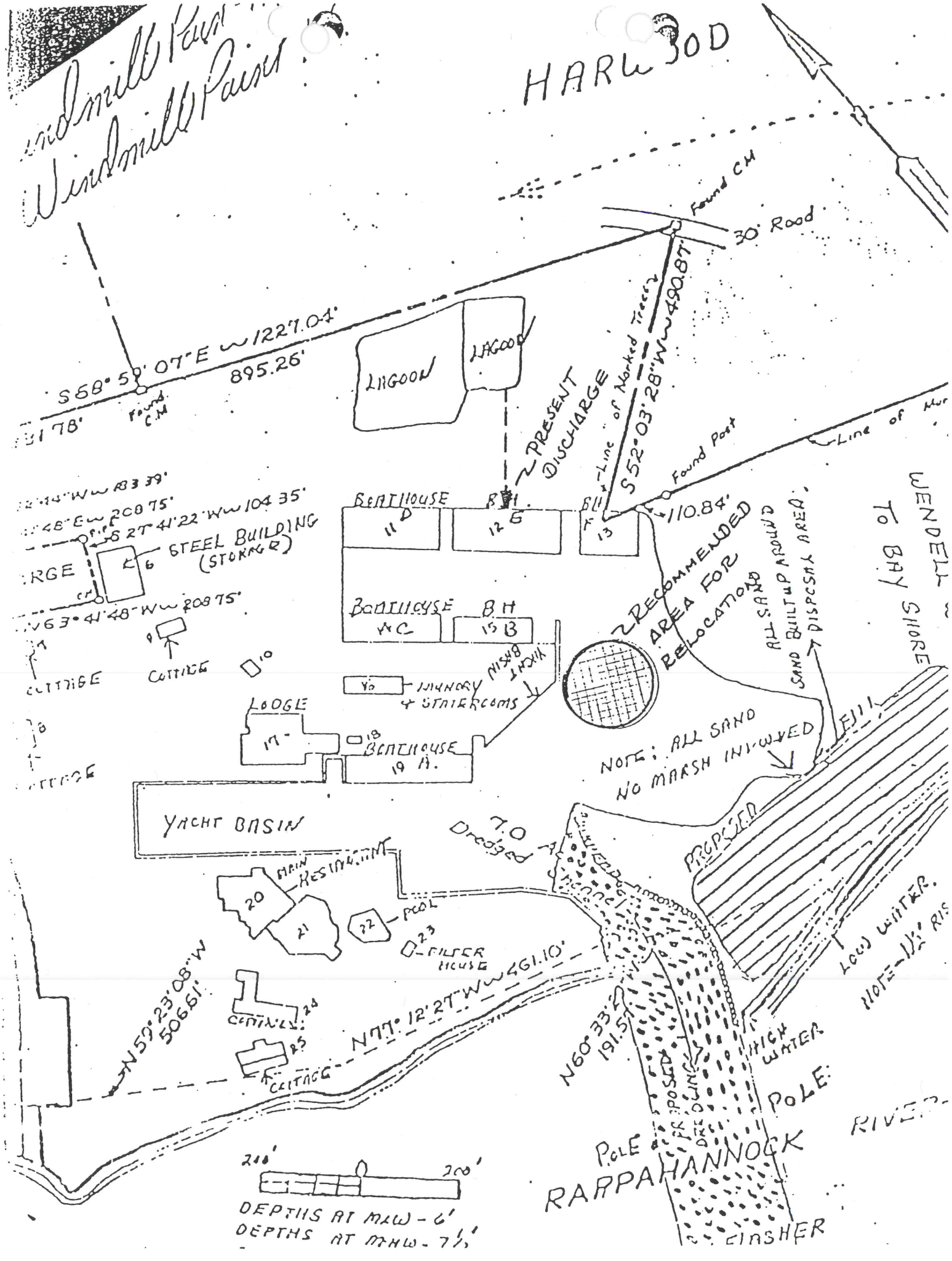
Sincerely,

James D. Taft

James D. Taft
Engineer
Tidewater Regional Office

dak

cc: SWCB - BAT; BWCM; TRO File
TRO - DSP
SDU


Windmill Point
Windmill Point
HARWOOD
Found CM
30' Road
S68° 58' 07" E w 1227.04'
895.26'
Found C.M
LAGOON
LAGOON
PRESENT DISCHARGE
Line of Marked Trees
S 52° 03' 28" W w 490.87'
Found Post
Line of Mar
110.84'
BOATHOUSE
11 D
12 G
13
STEEL BUILDING (STORAGE)
S 27° 41' 22" W w 104.35'
S 63° 41' 48" W w 208.75'
COTTAGE
COTTAGE
BOATHOUSE W C
B H 15 B
RECOMMENDED AREA FOR RELOCATION
ALL SAND BUILT UP AROUND
SAND DISPOSAL AREA
WENDELL
TO BAY SHORE
HIGHWAY MEN'S & WOMEN'S RESTROOMS
LODGE
17
18
BOATHOUSE 19 A.
NOTE: ALL SAND
NO MARSH INVOLVED
FILL
YACHT BASIN
Dredged
PROPOSED
MAIN RESIDENCE
20
21
22
POOL
23
FILTER HOUSE
CONTINUED
24
25
COTTAGE
N 59° 23' 08" W
506.61'
N 77° 12' 27" W w 461.10'
N 60° 33'
191.5'
MEAN HIGH WATER
LOW WATER
POLE
POLE
RAPPAHANNOCK
RIVER
FISHER
200'
200'
DEPTHS AT MLW - 6'
DEPTHS AT MHW - 7½'

MEMORANDUM

State Water Control Board

2111 North Hamilton Street P. O. Box 11143 Richmond, VA. 23230

SUBJECT: WINDMILL POINT PERMIT LIMITS

TO: J. D. Taft, TRO

FROM: M. D. Phillips, BWCM MDPhillips

DATE: December 8, 1980

COPIES: B. R. Tuxford, BAT

I have looked at your rationale memo and concur that a model will in all probability not give considerably better assurance of maintaining standards than engineering judgement and agree with your recommendations with one exception.

I do believe that relocation of the outfall would be of benefit, but think you should consider requiring a subsurface, mid-basin discharge point with a diffuser of some sort attached. This would remove the discharge from the edges of the basin and should greatly enhance flushing.

/ltc

BWCM (DALE PHILLIPS)

MEMORANDUM

State Water Control Board
2111 North Hamilton Street P. O. Box 11143 Richmond, VA. 23230

SUBJECT: Rationale for Windmill Point Permit Limits

TO: D. Phillips, BWCM

FROM: J. D. Taft JDT

DATE: December 5, 1980

COPIES: TRO File, BAT

Introduction

The owners of the subject facility have applied for a permit amendment to increase flows from the 0.020 MGD presently specified in the permit, to 0.030 MGD. In an effort to evaluate the impact of the proposed amendment, several steps were taken. First, the opinions of other interested agencies were solicited.

The State Department of Health is concerned that a river discharge might require additional shellfish condemnations. The boat basin acts as large holding pond which provides additional treatment and detention time. In addition, the owner has stated that the boat basin discharge is the preferred point of discharge from his point of view.

Field Studies

Field studies were conducted at the marina from November 3, 1980 through November 5, 1980 in order to determine the tidal ranges and the flushing characteristics of the basin (see attached map). Rhodamine dye was released in the effluent weir of the marina sewage treatment plant (point b). An automatic sampler was placed at the mouth of the basin (point d). Samples were collected every two hours for a forty-eight hour period. Samples were then analyzed on a flourometer. In addition, a tide recorder was installed at an intermediate point (point c) in the basin. Results of dye recovery at the mouth and tidal variations are plotted on the attached graph.

In general, it was apparent that the basin exhibited poor flushing characteristics. A sample collected from point a after 48 hours exhibited a higher dye concentration than any of the samples collected from the mouth of the basin, indicating that the basin had only partially flushed during the test period. From the point of view of visual observation, the discharge from the STP was observed entering the basin directly under the various boats which are docked there.

Modeling

An attempt was made to apply a model entitled, "A Model of Tidal Flushing for Small Coastal Basins" (A. Y. Kuo - V.I.M.S.) to the Windmill Point situation. The objective of the model (copy attached) is to calculate the equilibrium distribution of introduced pollutants. The model was designed to apply to situations where tidal excursion rates vary throughout the water body. The water body is therefore divided into segments, each having a length equal to the local tidal

Several assumptions were made in order to apply the model to this situation. The key assumption was that the entire basin was considered to be one segment. The basic equations used are as follows:

$$C = \frac{Y}{1-(1-Y)e^{-K}}(C_o) \quad \text{(Equation 10)}$$

$$Y = \frac{1}{(V+P)\left(\frac{1}{(1-\alpha)P}\right)} \quad \text{(Equation 5)}$$

$$C_o = \frac{Q}{(1-\alpha)P} \quad \text{(Equation 4)}$$

where: Q = net amount of pollutant flushed across basin
C = concentration distribution of a nonconservative pollutant
Y = flushing rate; portion of pollutant removed per tidal cycle
K = nonconservative pollutant decay rate
C_o = concentration distribution of conservative pollutant
V = low tide volume of segment
P = intertidal volume of segment
α = return ratio; fraction of water entering basin at flood tide which left on previous ebb tide

The following values for these variables were assigned:

C_o = 0.66 mg/l (calculated, based upon 15,000 gallons per tide at 30 mg/l)
K = 0.01 (assumed BOD_5 decay rate)
Q = 1.7 kg (calculated, based upon 15,000 gallons per tide at 30 mg/l)
V = 3,660,000 cubic feet (calculated)
P = 610,000 cubic feet (calculated)
α = .85 (calculated)

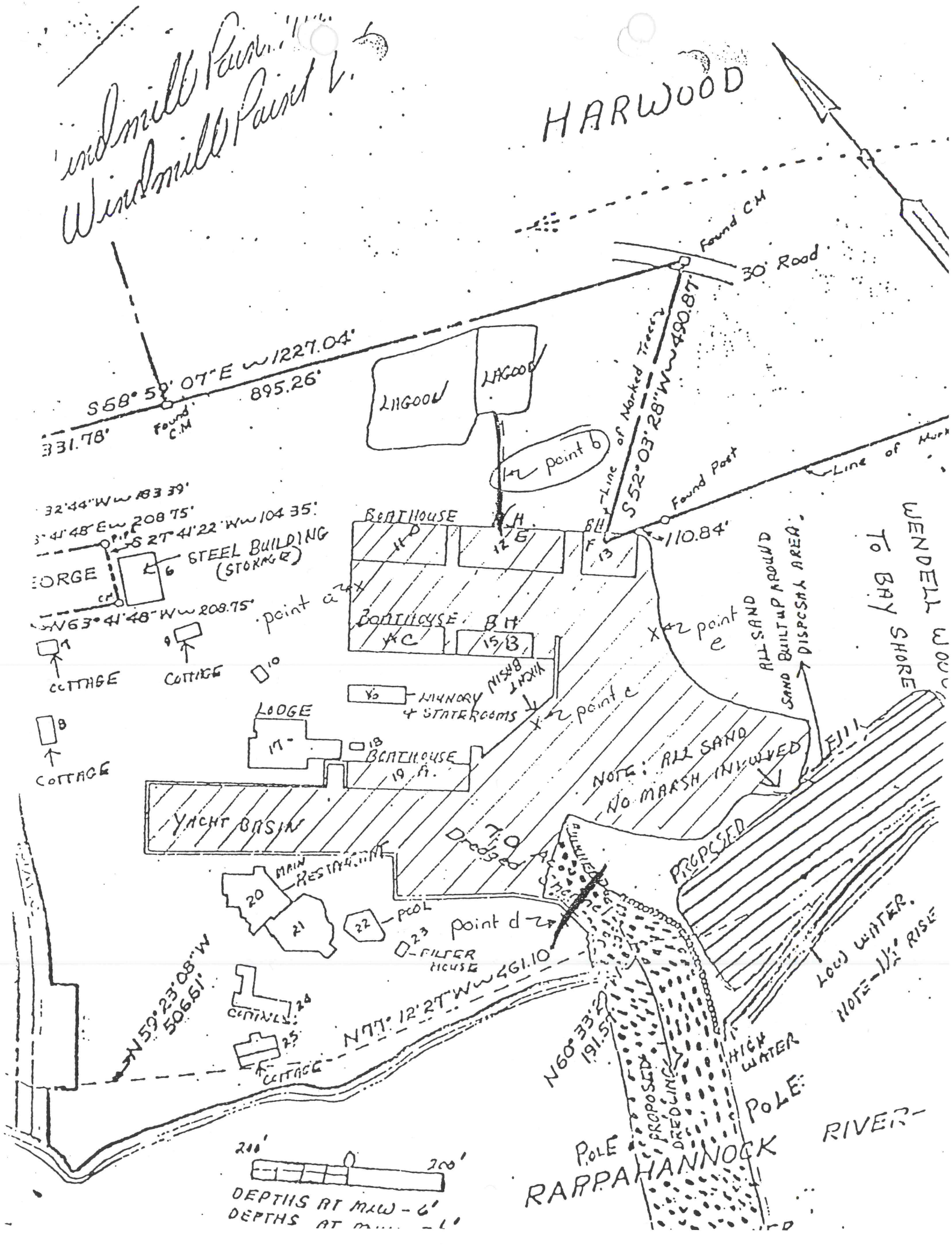
Two sets of calculations were performed. In the first, a flushing rate, Y, was calculated to be 0.2. This in turn yields a final concentration distribution, C, of 0.64 mg/l. In the second, the flushing rate was fixed at 0.85. This yielded a final concentration of 0.56 mg/l. In other words, for the basin under consideration, the equilibrium concentration for BOD_5 did not vary greatly over difrerent flushing rates. The model used varies somewhat from the original concept in that the entire basin was considered to be one segment.

Discussion

In the opinion of the author the marina basin cannot be adequately described by a model due to the restricted mouth and unusual configuration. I feel that limitations and requirements based upon best engineering judgement and common sense would be more defensible. It is felt that the relocation of the outfall in the vicinity of point e would be preferable. This would aid the limited

flushing ability of the basin and prevent the occurrence of depressed dissolved oxygen conditions in the corners of the basin. In conjunction with this change, rigorous Reliability Class I requirements should be applied to a discharge in the basin to protect shellfish waters and the adjacent recreational area. Under these circumstances, the author recommends that the permit be amended with present limits (30/30) at a design flow of 0.030 MGD.

dak


Windmill Point
Windmill Point
HARWOOD
Found C.M
30' Road
S58° 59' 07"E 1227.04'
895.26'
331.78'
Found C.M
LAGOON
LAGOON
Point b
Line of Marked Trees
S 52° 03' 28" W 490.87'
Found Post
110.84'
Line of Mark
BOATHOUSE
STEEL BUILDING (STORAGE)
CONCRETE
CONCRETE
Point a
Point e
Point c
Point d
ALL SAND BUILT UP AROUND DISPOSAL AREA.
WENDELL WOOD
TO BAY SHORE
COTTAGE
COTTAGE
COTTAGE
COTTAGE
LODGE
BOATHOUSE
19 ft.
YACHT BASIN
MAIN RESTAURANT
POOL
FILTER HOUSE
NOTE: ALL SAND
NO MARSH INVOLVED
PROPOSED
BULKHEAD
PROPOSED DREDGING
LOW WATER.
NOTE-1½' RISE
HIGH WATER
POLE
POLE
RAPPAHANNOCK
RIVER
N59° 23' 08" W 506.61'
N77° 12' 27" W 461.10'
N60° 33' 191.5'
200'
200'
DEPTHS AT MLW - 6'
DEPTHS AT

BY JDT DA ... SUBJECT WINDMILL P)T

CHKD. BY ... DATE ... SHEET NO. ... OF ...

JOB NO. ...

TIDE (IN FEET)

DYE CONCENTRATION (NO UNITS)

High Tide

FLUSHING

Low Tide

08/13/11

11/14/11

11/15/11

A MODEL OF TIDAL FLUSHING FOR SM[illegible] L BASINS

Albert Y. Kuo
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

Abstract

An empirical theory is proposed to model the flushing of a small coastal basin by tidal exchange. The theory is adapted from Ketchum's[2] tidal prism concept with modification. The application of the method requires that a water body be divided into segments such that complete mixing at high tide within each segment may be assumed. Starting from the mouth, each segment is defined such that its volume at low tide equals the total tidal prism landward from the inner boundary of the segment. Therefore, each segment has a length equal to the local tidal excursion.

The flushing capability of a segment is defined as the fraction of dissolved substance removed per tidal cycle, i.e. the flushing rate, which was derived from the principle of mass-balance. The concentration distribution of an introduced pollutant was expressed in terms of discharge rate, volume, flushing rate, and decay rate. A model has been set up for the Cockrell Creek of Virginia to study a proposed 0.2 MGD STP. The model was used to project the distribution of fecal coliform bacteria and biochemical oxygen demand.

Introduction

Estuaries and coastal waters are being used more and more frequently as dumping grounds for pollutants resulting from human activities. If properly balanced with the assimilative capacity, this may be a practical use of these water bodies. However, careful planning must be executed such that the introduced pollutants will not upset the ecological balance and preclude other usage of the water bodies.

The application of water quality models has proven to be a powerful technique in water resource management. The primary results of the model are the prediction of the distribution and concentration resulting from discharge of a new pollutant, or an increase or decrease of an existing pollutant discharged to a water body. The fundamental goal of a water quality model is to represent the complex interaction of the prototype in a simplified form which not only simulates the existing conditions with accuracy but also can predict the likely consequence of a proposed change of pollutant discharge.

The majority of recent developments in the field of water quality modeling pertain to numerical mathematical modeling[1]. These models used advanced computer techniques to find solutions to the governing equations of motion and mass balance. An important feature of these models is the requirement of substantial data from prototype, either for input data or for calibration and verification of the model. The application of these models to a particular water body often involves a large investment of time and effort. In the case of small coastal basins (e.g. a coastal creek of the order of 10 km long, 100 meters width), it is usually impractical to use this kind of model to study a proposed small waste discharge. A simple tidal flushing model for small coastal basins which requires only the data of tidal range and basin topography is described in this paper.

Theoretical Consideration and Basic Assumptions

The tidal prism concept has been used to evaluate the ability of an estuary to disperse pollutants[2,3]. The tidal prism is equal to the difference between water volumes at high and low tides. In an estuary, part of this volume is contributed by river flow, part by water which enters through the seaward boundary on the flooding tide. In a small coastal basin, the contribution of river water may be so small at times that the tidal prism consists wholly of the water brought in by the tide. This inter-tidal volume of water serves to dilute the introduced pollutants and eventually flushes them out of the estuary or coastal basin.

The objective of this model is to calculate the equilibrium distribution of introduced pollutants. During each tidal cycle, the pollutant concentration at any location varies with the stage of the tide, but on successively similar tidal stages, the pollutant concentration returns to the same value. For the equilibrium condition to exist, the pollutant discharge rates and river flow, if any, must be kept constant for a period much longer than the flushing time of the water body.

Ketchum's[3] assumption of the tidal prism concept is adapted with modification. Ketchum assumed complete mixing of the water entering on flood tide with all of the water present throughout the estuary at low tide. He further assumed that the maximum length of the estuary over which complete mixing is possible is determined by the average excursion of a water particle on the flood tide. In the present model, Ketchum's second assumption is retained and the water body is divided into segments of length equal to the local tidal excursion. Instead of complete mixing with all water present at low tide, the water entering on flood tide is assumed to mix completely with the water present in the most seaward segment at low tide. Some portion of this mixture, in turn, enters the next landward segment and mixes completely with the water present there at low tide. This process progresses landward until the limit of the estuary or coastal basin. On the ebb tide, the part of water making up the local inter-tidal volume of each segment escapes to the adjacent seaward segment. The flushing is thus accomplished by a series of tidal exchanges with the pollutants moving progressively seaward.

Segmentation

For the purpose of model construction, a water body is divided into segments each having a length equal to the local tidal excursion. In a small coastal basin, the critical time for water quality is usually at the period when the freshwater input is at a minimum, or zero. The method of segmentation employed by Ketchum cannot be applied because it requires the river flow as a non-zero parameter to start the segmentation process from the head of the estuary. In the present model, the segmentation process starts from the mouth of the water body and the length of each segment is chosen to equal the tidal excursion with zero freshwater inflow.

Figure 1 shows the plan view of a coastal basin with its volume V(x) and tidal prism P(x) plotted as function of distance x from the mouth. V(x) is defined

as the accumulated tidal volume along the main stem from the mouth to transect x. P(x) is the inter-tidal volume from the transect at x, including those of branches. The most seaward segment (segment no. 1) is defined between transects 1 and 2 such that its low-tide volume V_1 equals to the tidal prism landward of transect 2, i.e. P_2. In general,

$$\begin{aligned} V_n &= P_{n+1} \\ &= P_{n+2} + P_{n+1} \\ &= V_{n+1} + P_{n+1} \end{aligned} \tag{1}$$

where V_n is the low-tide volume of the nth segment which is between the nth and (n+1)th transects, P_{n+1} is the tidal prism landward from the (n+1)th transect and P_{n+1} is the local tidal prism, or inter-tidal volume of the (n+1)th segment. Therefore, the low tide volume of a segment equals the tidal prism landward from it and also it is equal to the high-tide volume of its adjacent landward segment.

The low-tide volume of a segment decreases monotonically landward as the tidal prism decreases. If the basin has a vertical shoreline, then in principle, $V_n \to 0$ as $n \to \infty$ and there will be an infinite number of segments. Complete mixing is never achieved at the landward end of the basin because of the diminishing tidal excursion. If the basin has a sloping beach, the volume of the most landward segment may be chosen as the tidal prism of those areas which are exposed at low tide and submerged at high tide.

Each of the branches of the basin may be segmented in the same way as that of the main stem.

Distribution of Conservative Pollutants

If one assumes that a conservative pollutant is discharged into the mth segment at a rate of Q per tide, the pollutant concentration in each segment may be calculated by considering the mass balance.

Segments Seaward of Outfall

Under equilibrium conditions, the net amount of the pollutant 'flushed' across a transect seaward of the outfall, i.e. $n \leq m$, must be equal to Q. A volume of water P_n is transported seaward and landward on ebb and flood tides respectively. Let C_n be the concentration of the nth segment at high tide, then the total mass transported seaward during ebb tide is $P_n C_n$. Since the flooding water is assumed to mix completely with the water present in the (n-1)th segment at low tide before it is transported across the nth transect, that water transported landward will have concentration C_{n-1}, the concentration of the (n-1)th segment at high tide. Therefore

$$P_n C_n - P_n C_{n-1} = Q, \text{ or}$$

$$C_n = C_{n-1} + \frac{Q}{P_n} \qquad \text{for } m \geq n \geq 1 \tag{2}$$

Equation (2) requires that C_0 be specified before the concentration distribution may be calculated. This is equivalent to the boundary condition requirement for solution of the convection-diffusion equation. Assuming that a fraction α of the water entering the basin through transect 1 on flood tide is water that escaped from the basin during the previous ebb tide, then

$$C_o = \alpha C_1$$

and equation (2) becomes

$$C_1 = \frac{Q}{(1-\alpha)P_1} \qquad \text{for } n = 1 \tag{3}$$

In general, equation (2) becomes

$$C_n = \frac{Q}{(1-\alpha)P_1} + \sum_{i=2}^{n} \frac{Q}{P_i} \tag{4}$$

If a flushing rate γ_n is defined as the portion of the pollutant removed from the nth segment per tidal cycle, mass balance requires that

$$\gamma_n C_n (V_n + P_n) = Q$$

where $C_n (V_n + P_n)$ is the total mass of the pollutant in the nth segment at high tide. Then

$$\gamma_n = \frac{Q}{(V_n + P_n) C_n}$$

$$= \frac{1}{(V_n + P_n)\left(\frac{1}{(1-\alpha)P_1} + \sum_{i=2}^{n} \frac{1}{P_i}\right)} \tag{5}$$

Segment Landward of Outfall

If the nth segment is located landward from the outfall, calculation of the pollutant concentration may be considered an intrusion problem. Under equilibrium conditions, there should be no net transport of the pollutant across the nth transect, thus

$$P_n C_n - P_n C_{n-1} = 0$$

$$C_n = C_{n-1}$$

In general,

$$C_n = C_m \qquad \text{if } n \geq m \tag{6}$$

Distribution of Nonconservative Pollutants

In addition to flushing by tidal action, a nonconservative pollutant will undergo a decaying process which will further reduce the concentration distribution in a water body. The mechanisms of tidal flushing and decay may be assumed to work independently and their combined effect may be studied through the principle of mass-balance in a segment of the basin.

If W_n is the total mass of the pollutant in the nth segment, then the amount of the pollutant removed per tidal cycle by tidal flushing is $\gamma_n W_n$, where γ_n is the flushing rate defined previously. The remaining mass of the pollutant $(1-\gamma_n)W_n$ will undergo decay. Assuming that the pollutant decays linearly with a decay rate of k per tide, the amount of the pollutant decaying in one tidal cycle will be $(1-\gamma_n) W_n (1-e^{-k})$. Therefore, the total loss of the pollutant per tidal cycle is

$W_n = \gamma_{n+1}W_{n+1} + (1-\gamma_n)e^{-k}W_n$

Under equilibrium conditions, the amount of the pollutant has to be supplied by the adjacent segment closer to the pollutant source, thus,

$$(1-(1-\gamma_n)e^{-k})W_n = \gamma_{n+1}W_{n+1}$$

or

$$W_n = \frac{\gamma_{n+1}W_{n+1}}{1-(1-\gamma_n)\,e^{-k}} \qquad (7)$$

If the pollutant were not decaying during the time it is transported from the (n+1)th segment to the nth segment, equation (7) might be reduced to

$$(W_n)_o = \frac{\gamma_{n+1}}{\gamma_n} W_{n+1} \qquad (8)$$

where $(W_n)_o$ is the total mass of the pollutant in the nth segment with no decay in the segment. By combining equations (7) and (8), the following is obtained

$$W_n = \frac{\gamma_n}{1-(1-\gamma_n)e^{-k}} (W_n)_o \qquad (9)$$

Equation (9) states that the factor for pollutant reduction due to decay within the nth segment is

$$\frac{\gamma_n}{1-(1-\gamma_n)\,e^{-k}}$$

which also has been shown independently by Ketchum, et al.[4]. Equations (4) and (6) give the concentration distribution due to the flushing by tidal action alone. After applying the decaying factor, the concentration distribution of a nonconservative pollutant may be summarized as follows:

$$C_n = \sum_{i=n}^{m} \frac{\gamma_i}{1-(1-\gamma_i)e^{-k}} (C_n)_o \quad \text{if } n \le m \qquad (10)$$

and

$$C_n = \sum_{i=m}^{n} \frac{\gamma_i}{1-(1-\gamma_i)\,e^{-k}} (C_n)_o \quad \text{if } n > m \qquad (11)$$

where $(C_n)_o$ is the concentration of a conservative pollutant and is given by equation (4) or (6).

If the decay rate is zero, equations (10) and (11) reduce to $C_n = (C_n)_o$. It is apparent that for any given flushing rate, any increase in the decay rate will decrease the concentration. However for a pollutant with a given decay rate, a larger flushing rate will result in higher relative concentrations compared to those of the conservative pollutant, since the pollutant remains within the segment of the water body for a shorter time.

Model Application

The model has been applied to the Cockrell Creek, Virginia, a small coastal basin located near the mouth of the Great Wicomico River, which itself is a tributary of the Chesapeake Bay. The creek is about 3.5 miles (5.63 km) long with a width ranging from 300 ft. (91.5m) to 1300 ft. (397m). The total drainage area is 4.6 mi (11.9 [illegible]). Examination of the salinity distribution (fi[illegible]) reveals that at times in the summer the creek is well [illegible] and the freshwater inflow is almost zero. [illegible]tion makes the tidal prism concept most applicable.

A 0.2 MGD (0.0088 m^3/S) sewage treatment plant was proposed for the treatment of the sewage from the town of Reedville and two nearby fish processing plants. The primary environmental concern is the effect of the proposed waste discharge on the shellfish due to the possible increase of coliform bacteria and depletion of dissolved oxygen. The Food and Drug Administration has a water quality standard of 14 MPN/100 ml of fecal coliform for shellfish harvesting.

Figure 3 shows the segmentation of Cockrell Creek according to the tidal prism concept. The tidal prisms, low-tide volumes and flushing rates are listed in Table 1. Two sets of flushing rates were calculated, with $\alpha = 0$ and 0.5 respectively, where α is the fraction of the water entering the creek at flood tide which left the creek during the previous ebb tide. It is preferable that α be determined by a tracer experiment in the prototype. However, the data in the table show that the dependence of flushing rates on the value of α diminishes rapidly in the landward direction. For example, a change of α from 0.0 to 0.5 changes the flushing rate at segment M5 by only 11%.

The model was used to calculate the fecal coliform and BOD (biochemical oxygen demand) concentrations in the creek. The proposed outfall is located in segment M5. The effluent is secondary treated sewage with 24 mg/l of BOD_5 and 200/100 ml of fecal coliform. Assuming a BOD decay rate of 0.1/tide and coliform die-off rate of 0.5/tide, the following concentrations for segments adjacent to the outfall were obtained with the flushing rates corresponding to $\alpha = 0.5$:

Segment	BOD mg/l	Fecal Coliform MPN/100 ml
M4	0.048	0.09
M5	0.078	0.25
M6	0.065	0.14
B1	0.070	0.17
C1	0.074	0.21

The above table shows that the increase in the fecal coliform count at segment M5 will be 0.25/100 ml if α is assumed to be 0.5. For a more conservative estimate, α is assumed to be 0.9, then the flushing rate and fecal coliform count at segment M5 will be 0.113/tide and 0.28/100 ml respectively. The low sensitivity of the coliform concentration in response to the value of α lies in the fact that the lower flushing rate allows a longer time for bacteria to die off in any particular segment.

Discussion

The tidal prism method of Ketchum has been modified and applied to small coastal basins with negligible freshwater runoff. Ketchum's method was designed for use in the estuaries where the freshwater may be treated as a tracer. In his method, the estuary is segmented from its head to mouth using both the river flow and tidal prism as parameters. The segmentation process fails in the singular case of zero freshwater inflow. The modified method proposed here uses the tidal prism as the sole parameter to segment a coastal basin from [illegible]. The flushing rate of each segment

Table 1. Values of P_n, V_n, Y_n for the segments of the Cockrell Creek.

Segment or Transect	P_n (10^4 ft.^{3})	V_n (10^4 ft.^{3})	Y_n (1/tide) α=0.0	Y_n (1/tide) α=0.5
M1	3810			
M2	3355	3355	1.00	0.5
A1	215	2920	0.53	0.36
A2	170	170	0.89	0.85
A3	120	120	0.53	0.52
M3	2705	357	0.11	0.11
M4	2317	2317	0.40	0.31
M5	2105	2105	0.32	0.27
B1	603	1799	0.26	0.23
B11	136	500	0.47	0.44
B12	105	105	0.68	0.66
B2	364	255	0.14	0.14
B21	60	296	0.44	0.42
B3	236	156	0.25	0.25
B31	84	180	0.40	0.39
B4	96	192	0.16	0.16
C1	246	359	0.11	0.11
C2	200	200	0.69	0.66
C3	155	155	0.46	0.45
C4	122	122	0.37	0.37
M6	950	313	0.09	0.09
D1	62	787	0.37	0.33
M7	725	138	0.26	0.26
M8	600	600	0.32	0.31
E1	93	493	0.28	0.27
M9	400	196	0.21	0.21
M10	280	280	0.30	0.29
M11	200	200	0.30	0.29
M12	150	150	0.29	0.29
M13	100	100	0.28	0.28
M14	60	60	0.30	0.30
	60	60	0.17	0.17

was derived from a more rigorous mass-balance principle instead of intuitively defining it as the ratio of intertidal volume to segment volume.

The proposed model is most practical for environmental studies for a small project in a small coastal basin. In the absence of freshwater runoff, the small coastal basins tend to be well-mixed and the tidal exchange is the sole mechanism to flush out the pollutant. The method requires a minimum amount of data: the tidal range and the volume of the basin. The only parameter which needs to be calibrated is the returning ratio α, the fraction of water entering the basin at flood tide which left the basin during the previous ebb tide. This parameter may be determined by conducting tracer experiments in the prototype. However, the dependence of the flushing rates on the value of α decreases rapidly as the segments proceed landwards. The predicted concentration distribution of a nonconservative pollutant is rather insensitive to the change in the value of α.

Acknowledgements

I wish to thank Mr. G. Parker for his help with the numerical calculation. This model was developed under the Cooperative State Agencies Program, the continuing support of the Virginia State Water Control Board is appreciated.

This is Contribution No. 746 from Virginia Institute of Marine Science.

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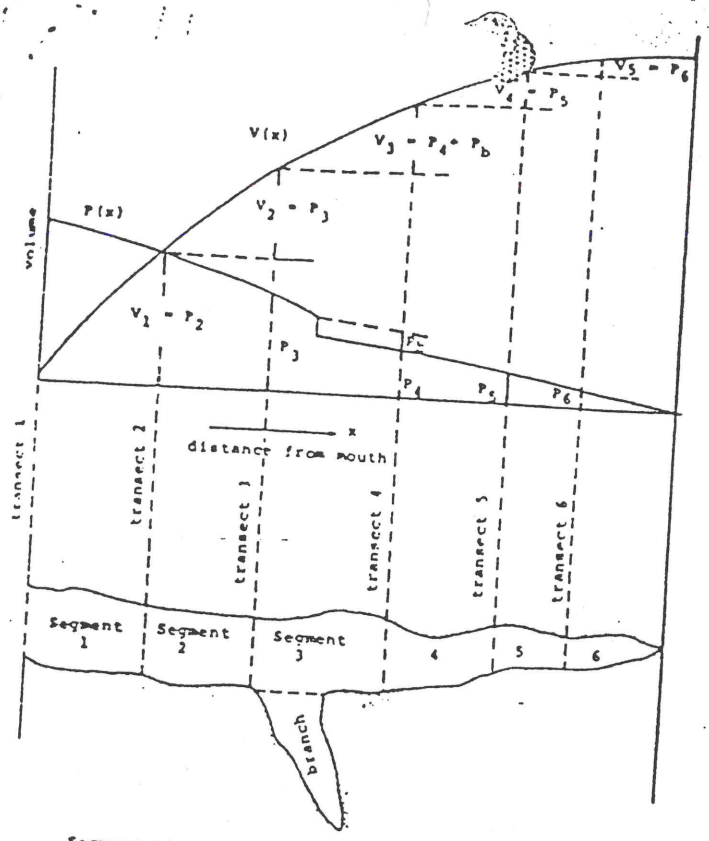


Segmentation Criterion: $V_n = P_{n+1} + P_b$

V_n = low-tide volume of the nth segment

P_{n+1} = tidal prism landward from the (n+1)th transect

P_b = tidal prism of the branch connecting to the segment

Figure 1. Segmentation of a Coastal Basin.

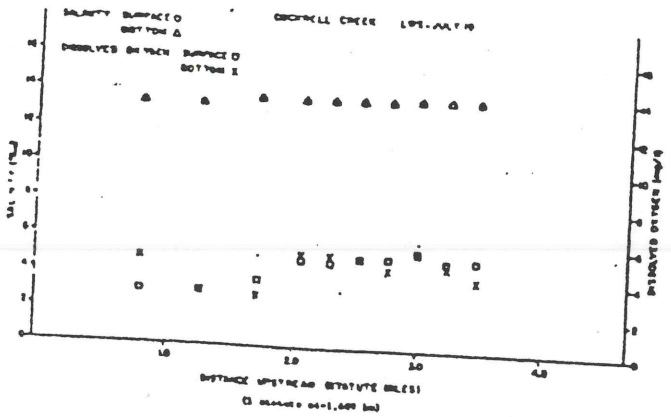


Figure 2. Longitudinal Salinity Distribution in the Cockrell Creek, Virginia.

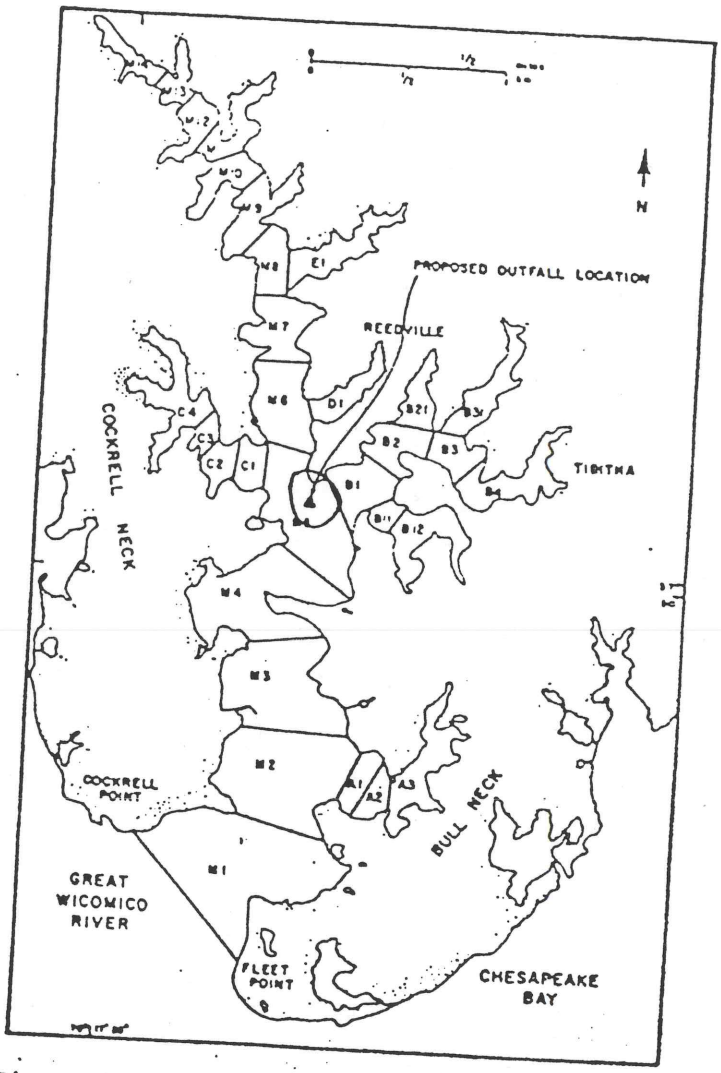


Figure 3. Segmentation of the Cockrell Creek.

Attachment F

DMR and Form 2A effluent data

Windmill Point Resort & Yacht Harbor WWTP
DMR Data
July 2005 - March 2011

DMR Due Date	DMR Received Date	Flow		pH		BOD5				TSS				TRC		Fecal Coliform	Ammonia		Enterococci
		Monthly Average (MGD)	Monthly Maximum (MGD)	Minimum (SU)	Maximum (SU)	Monthly Average (mg/L)	Weekly Average (mg/L)	Monthly Load (kg/d)	Weekly Load (kg/d)	Monthly Average (mg/L)	Weekly Average (mg/L)	Monthly Load (kg/d)	Weekly Load (kg/d)	Monthly Average (µg/L)	Weekly Average (µg/L)	Monthly Geometric Mean (N/100mL)	Monthly Average (mg/L)	Weekly Average (mg/L)	Monthly Geo.Mean (N/100mL)
2005-2010 Permit Limit -->		NL	NL	6.0	9.0	30	45	3.4	5.1	30	45	3.4	5.1	12.9	15.3	200	2.3	2.3	35
10-Jul-06	10-Jul-06																		
10-Aug-06	9-Aug-06	0.02	0.02	7	7	<QL	<QL	<QL	<QL	1.2	1.2	0.09	0.09	<QL	<QL	23			
10-Sep-06	11-Sep-06																		
10-Oct-06	10-Oct-06	0.02	0.02	7	7.5	<QL	<QL	<QL	<QL	1.4	1.4	0.1	0.1	<QL	<QL	250			
10-Nov-06	13-Nov-06	0.019	0.02	7	7.5	6	6	0.45	0.45	16	16	1.21	1.21	<QL	<QL	95			
10-Dec-06	10-Dec-06	0.016	0.02	7	7	<QL	<QL	<QL	<QL	7.3	7.3	0.55	0.55	<QL	<QL	<2			
10-Jan-07	10-Jan-07	0.019	0.02	7	7	16	16	1.2	1.2	43	43	3.25	3.25	<QL	<QL	<2			
10-Feb-07	12-Feb-07	0.019	0.02	7	7	<QL	<QL	<QL	<QL	4	4	0.3	0.3	<QL	<QL	<2			
10-Mar-07	12-Mar-07																		
10-Apr-07	10-Apr-07	0.02	0.02	7	7	<QL	<QL	<QL	<QL	3.3	3.3	0.25	0.25	<QL	<QL	<2			
10-May-07	10-May-07																		
10-Jun-07	11-Jun-07	0.019	0.02	6.5	7	<QL	<QL	<QL	<QL	5.1	5.1	0.39	0.39	<QL	<QL	<36			
10-Jul-07	9-Jul-07																		
10-Aug-07	10-Aug-07																		
10-Sep-07	10-Sep-07	0.014	0.02	7	7	18	18	0.3	0.3	10.9	10.9	0.82	0.82	<QL	<QL	227			
10-Oct-07	9-Oct-07																		
10-Nov-07	13-Nov-07																		
10-Dec-07	10-Dec-07	0.019	0.02	7	7.5	<QL	<QL	<QL	<QL	1.7	1.7	0.13	0.13	<QL	<QL	<2			
10-Jan-08	10-Jan-08																		
10-Feb-08	11-Feb-08																		
10-Mar-08	10-Mar-08	0.02	0.02	7	7	<QL	<QL	<QL	<QL	7.6	7.6	0.29	0.29	<QL	<QL	<2			
10-Apr-08	10-Apr-08																		
10-May-08	12-May-08	0.012	0.02	6.5	7	<QL	<QL	<QL	<QL	2.5	2.5	0.19	0.19	<QL	<QL	<2			
10-Jun-08	10-Jun-08	0.02	0.02	6.5	7	<QL	<QL	<QL	<QL	2.3	2.3	0.17	0.17	<QL	<QL	<2			
10-Jul-08	10-Jul-08																		
10-Aug-08	11-Aug-08	0.019	0.02	7	7	<QL	<QL	<QL	<QL	1.7	1.7	0.12	0.12	<QL	<QL	<QL			
10-Sep-08	10-Sep-08																		
10-Oct-08	10-Oct-08	0.014	0.02	6.5	7	<QL	<QL	<QL	<QL	3.2	3.2	0.24	0.24	<QL	<QL	<2			
10-Nov-08	10-Nov-08																		
10-Dec-08	10-Dec-08																		
10-Jan-09	12-Jan-09	0.0197	0.02	6.5	7	<QL	<QL	<QL	<QL	5	5	0.38	0.38	<QL	<QL	<2			
10-Feb-09	10-Feb-09																		
10-Mar-09	10-Mar-09																		
10-Apr-09	9-Apr-09	0.02	0.02	7	7.5	<QL	<QL	<QL	<QL	3.6	3.6	0.27	0.27	<QL	<QL	<1			
10-May-09	11-May-09																		
10-Jun-09	9-Jun-09	0.016	0.03	7	7	7	7	0.4	0.4	11.1	11.1	0.6	0.6	<QL	<QL	<1			
10-Jul-09	9-Jul-09																		
10-Aug-09	10-Aug-09																		
10-Sep-09	8-Sep-09	0.018	0.02	7	7.5	7	7	0.5	0.5	16.3	16.3	1.23	1.23	<QL	<QL	<1			
10-Oct-09	13-Oct-09																		
10-Nov-09	9-Nov-09																		
10-Dec-09	10-Dec-09	0.015	0.015	7	7	<QL	<QL	<QL	<QL	2.3	2.3	0.131	0.131	<QL	<QL	<1			
10-Jan-10	11-Jan-10	0.015	0.015	7	7	<QL	<QL	<QL	<QL	3.4	3.4	0.19	0.19	<QL	<QL	<1			
10-Feb-10	9-Feb-10																		
10-Mar-10	10-Mar-10	0.015	0.015	7	7	14	14	0.79	0.79	28	28	1.59	1.59	<QL	<QL	<2			
10-Apr-10	12-Apr-10																		
10-May-10	10-May-10	0.011	0.015	7	7	24	24	1.4	1.4	8.8	8.8	0.5	0.5	<QL	<QL	<2			
10-Jun-10	10-Jun-10																		
10-Jul-10	13-Jul-10																		
10-Aug-10	10-Aug-10	0.009	0.01	7	7.5	7	7	0.3	0.3	10.1	10.1	0.4	0.4	<QL	<QL	9.5	X	X	X
10-Sep-10	10-Sep-10																		
10-Oct-10	12-Oct-10																		
10-Nov-10	10-Nov-10	0.01	0.01	7	7	<QL	<QL	<QL	<QL	3.1	3.1	0.117	0.117	<QL	<QL	<2	0.9	0.9	2400
10-Dec-10	9-Dec-10																		
10-Jan-11	10-Jan-11																		
10-Feb-11	8-Feb-11																		
10-Mar-11	9-Mar-11	0.015	0.015	7	7	9	9	0.5	0.5	12.4	12.4	0.7	0.7	<QL	<QL	<2	<QL	<QL	565
Average		0.017	0.019	6.9	7.1	12.0	12.0	0.6	0.6	8.3	8.3	0.5	0.5	#DIV/0!	#DIV/0!	120.9	0.9	0.9	1482.5
90th Percentile		0.020	0.020	7.0	7.5	19.2	19.2	1.2	1.2	16.2	16.2	1.2	1.2	#NUM!	#NUM!	240.8	0.9	0.9	2216.5
10th Percentile		0.012	0.015	6.5	7.0	6.8	6.8	0.3	0.3	1.7	1.7	0.1	0.1	#NUM!	#NUM!	14.9	0.9	0.9	748.5
Maximum		0.020	0.030		7.5	24.0	24.0	1.4	1.4	43.0	43.0	3.3	3.3	0.0	0.0	250.0	0.9	0.9	2400.0
Minimum		0.009	0.010	6.5		6.0	6.0	0.3	0.3	1.2	1.2	0.1	0.1	0.0	0.0	9.5	0.9	0.9	565.0

Windmill Point Resort & Yacht Harbor WWTP
VA0060569
Application 2A Data- 2012 Permit reissuance

Part A.12.

Parameter	Maximum Daily Value		Average Daily Value		
	Value	Units	Value	Units	Number of Samples
pH (minimum)	6.5	s.u.			
pH (maximum)	7.5	s.u.			
Flow Rate	0.020	MGD	0.0925	0.020	30
Temperature (Winter)	15.2	°C	11.9	°C	9
Temperature (Summer)	29.1	°C	28.1	°C	9

Pollutant		Maximum Daily Discharge		Average Daily Discharge			Analytical Method	ML/MDL
		Conc.	Units	Conc.	Units	Number of Samples		
CONVENTIONAL AND NON-CONVENTIONAL COMPOUNDS								
Biochemical Oxygen Demand (report one)	BOD-5	24	mg/L	9	mg/L	5	5210B	2
	CBOD-5							
Fecal Coliform		<2	mpn/100mL	<2	mpn/100mL	5	9221B	2
Total Suspended Solids (TSS)		28	mg/L	11.76	mg/L	5	2540D	1

Attachment G

MSTRANTI and STATS printouts, Nutrient Limitations Email

SALTWATER AND TRANSITION ZONES
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

0.030 MGD Plant
2012 Permit Reissuance

Facility Name: Windmill Point Resort & Yacht Harbor WWTP Permit No.: VA0060569
Receiving Stream: Windmill Point Boat Basin, tributary of Rappahannock River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	N/A	mg/l
90th % Temperature (Annual) =	27	(° C)
10th % Temperature (Annual) =	5.4	(° C)
90th % Temperature (Winter) =	N/A	(° C)
90th % Maximum pH =	8.2	
10th % Maximum pH =	7.4	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	16.15	(g/kg)

Mixing Information

Design Flow (MGD)	**0.03**
Acute WLA multiplier	2
Chronic WLA multiplier	10
Human health WLA multiplier	10

Effluent Information

Mean Hardness (as CaCO3) =	N/A	mg/L
90 % Temperature (Annual) =	29.1	(° C)
90 % Temperature (Winter) =	15.2	(° C)
90 % Maximum pH =	7.5	SU
10 % Maximum pH =	7	SU
Heated Discharge? (Y/N)	N	
Discharge Flow =	**0.03**	MGD

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Acenapthene	0	--	--	9.9E+02	--	--	9.9E+03	--	--	--	--	--	--	**--**	**--**	**9.9E+03**
Acrolein	0	--	--	9.3E+00	--	--	9.3E+01	--	--	--	--	--	--	**--**	**--**	**9.3E+01**
Acrylonitrile[C]	0	--	--	2.5E+00	--	--	2.5E+01	--	--	--	--	--	--	**--**	**--**	**2.5E+01**
Aldrin [C]	0	1.3E+00	--	5.0E-04	2.6E+00	--	5.0E-03	--	--	--	--	--	--	**2.6E+00**	**--**	**5.0E-03**
Ammonia-N (mg/l) - Annual	0	5.55E+00	4.45E-01	--	1.11E+01	4.45E+00	--	--	--	--	--	--	--	**1.11E+01**	**4.45E+00**	**--**
Ammonia-N (mg/l) - Winter	0	#VALUE!	#VALUE!	--	#VALUE!	#VALUE!	--	--	--	--	--	--	--	**#VALUE!**	**#VALUE!**	**--**
Anthracene	0	--	--	4.0E+04	--	--	4.0E+05	--	--	--	--	--	--	**--**	**--**	**4.0E+05**
Antimony	0	--	--	6.4E+02	--	--	6.4E+03	--	--	--	--	--	--	**--**	**--**	**6.4E+03**
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	3.6E+02	--	--	--	--	--	--	--	**1.4E+02**	**3.6E+02**	**--**
Benzene [C]	0	--	--	5.1E+02	--	--	5.1E+03	--	--	--	--	--	--	**--**	**--**	**5.1E+03**
Benzidine[C]	0	--	--	2.0E-03	--	--	2.0E-02	--	--	--	--	--	--	**--**	**--**	**2.0E-02**
Benzo (a) anthracene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (b) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (k) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (a) pyrene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Bis2-Chloroethyl Ether[C]	0	--	--	5.3E+00	--	--	5.3E+01	--	--	--	--	--	--	**--**	**--**	**5.3E+01**
Bis2-Chloroisopropyl Ether	0	--	--	6.5E+04	--	--	6.5E+05	--	--	--	--	--	--	**--**	**--**	**6.5E+05**
Bis2-Ethylhexyl Phthalate[C]	0	--	--	2.2E+01	--	--	2.2E+02	--	--	--	--	--	--	**--**	**--**	**2.2E+02**
Bromoform [C]	0	--	--	1.4E+03	--	--	1.4E+04	--	--	--	--	--	--	**--**	**--**	**1.4E+04**
Butylbenzylphthalate	0	--	--	1.9E+03	--	--	1.9E+04	--	--	--	--	--	--	**--**	**--**	**1.9E+04**
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	8.8E+01	--	--	--	--	--	--	--	**8.0E+01**	**8.8E+01**	**--**
Carbon Tetrachloride [C]	0	--	--	1.6E+01	--	--	1.6E+02	--	--	--	--	--	--	**--**	**--**	**1.6E+02**
Chlordane [C]	0	9.0E-02	4.0E-03	8.1E-03	1.8E-01	4.0E-02	8.1E-02	--	--	--	--	--	--	**1.8E-01**	**4.0E-02**	**8.1E-02**
TRC	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	7.5E+01	--	--	--	--	--	--	--	**2.6E+01**	**7.5E+01**	**--**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Chlorobenzene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**
Chlorodibromomethane[C]	0	--	--	1.3E+02	--	--	1.3E+03	--	--	--	--	--	--	**--**	**--**	**1.3E+03**
Chloroform	0	--	--	1.1E+04	--	--	1.1E+05	--	--	--	--	--	--	**--**	**--**	**1.1E+05**
2-Chloronaphthalene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**
2-Chlorophenol	0	--	--	1.5E+02	--	--	1.5E+03	--	--	--	--	--	--	**--**	**--**	**1.5E+03**
Chlorpyrifos	0	1.1E-02	5.6E-03	--	2.2E-02	5.6E-02	--	--	--	--	--	--	--	**2.2E-02**	**5.6E-02**	**--**
Chromium III	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chromium VI	0	1.1E+03	5.0E+01	--	2.2E+03	5.0E+02	--	--	--	--	--	--	--	**2.2E+03**	**5.0E+02**	**--**
Chrysene[C]	0	--	--	1.8E-02	--	--	1.8E-01	--	--	--	--	--	--	**--**	**--**	**1.8E-01**
Copper	0	9.3E+00	6.0E+00	--	1.9E+01	6.0E+01	--	--	--	--	--	--	--	**1.9E+01**	**6.0E+01**	**--**
Cyanide, Free	0	1.0E+00	1.0E+00	1.6E+04	2.0E+00	1.0E+01	1.6E+05	--	--	--	--	--	--	**2.0E+00**	**1.0E+01**	**1.6E+05**
DDD[C]	0	--	--	3.1E-03	--	--	3.1E-02	--	--	--	--	--	--	**--**	**--**	**3.1E-02**
DDE[C]	0	--	--	2.2E-03	--	--	2.2E-02	--	--	--	--	--	--	**--**	**--**	**2.2E-02**
DDT[C]	0	1.3E-01	1.0E-03	2.2E-03	2.6E-01	1.0E-02	2.2E-02	--	--	--	--	--	--	**2.6E-01**	**1.0E-02**	**2.2E-02**
Demeton	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Diazinon	0	8.2E-01	8.2E-01	--	1.6E+00	8.2E+00	--	--	--	--	--	--	--	**1.6E+00**	**8.2E+00**	**--**
Dibenz(a,h)anthracene[C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
1,2-Dichlorobenzene	0	--	--	1.3E+03	--	--	1.3E+04	--	--	--	--	--	--	**--**	**--**	**1.3E+04**
1,3-Dichlorobenzene	0	--	--	9.6E+02	--	--	9.6E+03	--	--	--	--	--	--	**--**	**--**	**9.6E+03**
1,4-Dichlorobenzene	0	--	--	1.9E+02	--	--	1.9E+03	--	--	--	--	--	--	**--**	**--**	**1.9E+03**
3,3-Dichlorobenzidine[C]	0	--	--	2.8E-01	--	--	2.8E+00	--	--	--	--	--	--	**--**	**--**	**2.8E+00**
Dichlorobromomethane[C]	0	--	--	1.7E+02	--	--	1.7E+03	--	--	--	--	--	--	**--**	**--**	**1.7E+03**
1,2-Dichloroethane[C]	0	--	--	3.7E+02	--	--	3.7E+03	--	--	--	--	--	--	**--**	**--**	**3.7E+03**
1,1-Dichloroethylene	0	--	--	7.1E+03	--	--	7.1E+04	--	--	--	--	--	--	**--**	**--**	**7.1E+04**
1,2-trans-dichloroethylene	0	--	--	1.0E+04	--	--	1.0E+05	--	--	--	--	--	--	**--**	**--**	**1.0E+05**
2,4-Dichlorophenol	0	--	--	2.9E+02	--	--	2.9E+03	--	--	--	--	--	--	**--**	**--**	**2.9E+03**
1,2-Dichloropropane[C]	0	--	--	1.5E+02	--	--	1.5E+03	--	--	--	--	--	--	**--**	**--**	**1.5E+03**
1,3-Dichloropropene[C]	0	--	--	2.1E+02	--	--	2.1E+03	--	--	--	--	--	--	**--**	**--**	**2.1E+03**
Dieldrin[C]	0	7.1E-01	1.9E-03	5.4E-04	1.4E+00	1.9E-02	5.4E-03	--	--	--	--	--	--	**1.4E+00**	**1.9E-02**	**5.4E-03**
Diethyl Phthalate	0	--	--	4.4E+04	--	--	4.4E+05	--	--	--	--	--	--	**--**	**--**	**4.4E+05**
2,4-Dimethylphenol	0	--	--	8.5E+02	--	--	8.5E+03	--	--	--	--	--	--	**--**	**--**	**8.5E+03**
Dimethyl Phthalate	0	--	--	1.1E+06	--	--	1.1E+07	--	--	--	--	--	--	**--**	**--**	**1.1E+07**
Di-n-Butyl Phthalate	0	--	--	4.5E+03	--	--	4.5E+04	--	--	--	--	--	--	**--**	**--**	**4.5E+04**
2,4 Dinitrophenol	0	--	--	5.3E+03	--	--	5.3E+04	--	--	--	--	--	--	**--**	**--**	**5.3E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	2.8E+02	--	--	2.8E+03	--	--	--	--	--	--	**--**	**--**	**2.8E+03**
2,4-Dinitrotoluene[C]	0	--	--	3.4E+01	--	--	3.4E+02	--	--	--	--	--	--	**--**	**--**	**3.4E+02**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	5.1E-08	--	--	5.1E-07	--	--	--	--	--	--	**--**	**--**	**5.1E-07**
1,2-Diphenylhydrazine[C]	0	--	--	2.0E+00	--	--	2.0E+01	--	--	--	--	--	--	**--**	**--**	**2.0E+01**
Alpha-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	8.7E-02	8.9E+02	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**8.9E+02**
Beta-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	8.7E-02	8.9E+02	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**8.9E+02**
Alpha + Beta Endosulfan	0	3.4E-02	8.7E-03	--	6.8E-02	8.7E-02	--	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**--**
Endosulfan Sulfate	0	--	--	8.9E+01	--	--	8.9E+02	--	--	--	--	--	--	**--**	**--**	**8.9E+02**
Endrin	0	3.7E-02	2.3E-03	6.0E-02	7.4E-02	2.3E-02	6.0E-01	--	--	--	--	--	--	**7.4E-02**	**2.3E-02**	**6.0E-01**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Endrin Aldehyde	0	--	--	3.0E-01	--	--	3.0E+00	--	--	--	--	--	--	**--**	**--**	**3.0E+00**
Ethylbenzene	0	--	--	2.1E+03	--	--	2.1E+04	--	--	--	--	--	--	**--**	**--**	**2.1E+04**
Fluoranthene	0	--	--	1.4E+02	--	--	1.4E+03	--	--	--	--	--	--	**--**	**--**	**1.4E+03**
Fluorene	0	--	--	5.3E+03	--	--	5.3E+04	--	--	--	--	--	--	**--**	**--**	**5.3E+04**
Guthion	0	--	1.0E-02	--	--	1.0E-01	--	--	--	--	--	--	--	**--**	**1.0E-01**	**--**
Heptachlor [C]	0	5.3E-02	3.6E-03	7.9E-04	1.1E-01	3.6E-02	7.9E-03	--	--	--	--	--	--	**1.1E-01**	**3.6E-02**	**7.9E-03**
Heptachlor Epoxide[C]	0	5.3E-02	3.6E-03	3.9E-04	1.1E-01	3.6E-02	3.9E-03	--	--	--	--	--	--	**1.1E-01**	**3.6E-02**	**3.9E-03**
Hexachlorobenzene[C]	0	--	--	2.9E-03	--	--	2.9E-02	--	--	--	--	--	--	**--**	**--**	**2.9E-02**
Hexachlorobutadiene[C]	0	--	--	1.8E+02	--	--	1.8E+03	--	--	--	--	--	--	**--**	**--**	**1.8E+03**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	4.9E-02	--	--	4.9E-01	--	--	--	--	--	--	**--**	**--**	**4.9E-01**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	1.7E-01	--	--	1.7E+00	--	--	--	--	--	--	**--**	**--**	**1.7E+00**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	1.6E-01	--	1.8E+00	3.2E-01	--	1.8E+01	--	--	--	--	--	--	**3.2E-01**	**--**	**1.8E+01**
Hexachlorocyclopentadiene	0	--	--	1.1E+03	--	--	1.1E+04	--	--	--	--	--	--	**--**	**--**	**1.1E+04**
Hexachloroethane[C]	0	--	--	3.3E+01	--	--	3.3E+02	--	--	--	--	--	--	**--**	**--**	**3.3E+02**
Hydrogen Sulfide	0	--	2.0E+00	--	--	2.0E+01	--	--	--	--	--	--	--	**--**	**2.0E+01**	**--**
Indeno (1,2,3-cd) pyrene C	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Isophorone[C]	0	--	--	9.6E+03	--	--	9.6E+04	--	--	--	--	--	--	**--**	**--**	**9.6E+04**
Kepone	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	**--**	**0.0E+00**	**--**
Lead	0	2.4E+02	9.3E+00	--	4.8E+02	9.3E+01	--	--	--	--	--	--	--	**4.8E+02**	**9.3E+01**	**--**
Malathion	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Mercury	0	1.8E+00	9.4E-01	--	3.6E+00	9.4E+00	--	--	--	--	--	--	--	**3.6E+00**	**9.4E+00**	**--**
Methyl Bromide	0	--	--	1.5E+03	--	--	1.5E+04	--	--	--	--	--	--	**--**	**--**	**1.5E+04**
Methylene Chloride [C]	0	--	--	5.9E+03	--	--	5.9E+04	--	--	--	--	--	--	**--**	**--**	**5.9E+04**
Methoxychlor	0	--	3.0E-02	--	--	3.0E-01	--	--	--	--	--	--	--	**--**	**3.0E-01**	**--**
Mirex	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	**--**	**0.0E+00**	**--**
Nickel	0	7.4E+01	8.2E+00	4.6E+03	1.5E+02	8.2E+01	4.6E+04	--	--	--	--	--	--	**1.5E+02**	**8.2E+01**	**4.6E+04**
Nitrobenzene	0	--	--	6.9E+02	--	--	6.9E+03	--	--	--	--	--	--	**--**	**--**	**6.9E+03**
N-Nitrosodimethylamine[C]	0	--	--	3.0E+01	--	--	3.0E+02	--	--	--	--	--	--	**--**	**--**	**3.0E+02**
N-Nitrosodiphenylamine[C]	0	--	--	6.0E+01	--	--	6.0E+02	--	--	--	--	--	--	**--**	**--**	**6.0E+02**
N-Nitrosodi-n-propylamine[C]	0	--	--	5.1E+00	--	--	5.1E+01	--	--	--	--	--	--	**--**	**--**	**5.1E+01**
Nonylphenol	0	7.0E+00	1.7E+00	--	1.4E+01	1.7E+01	--	--	--	--	--	--	--	**1.4E+01**	**1.7E+01**	**--**
Parathion	0	--	--	--	--	--	--	--	--	--	--	--	--	**--**	**--**	**--**
PCB Total[C]	0	--	3.0E-02	6.4E-04	--	3.0E-01	6.4E-03	--	--	--	--	--	--	**--**	**3.0E-01**	**6.4E-03**
Pentachlorophenol [C]	0	1.3E+01	7.9E+00	3.0E+01	2.6E+01	7.9E+01	3.0E+02	--	--	--	--	--	--	**2.6E+01**	**7.9E+01**	**3.0E+02**
Phenol	0	--	--	8.6E+05	--	--	8.6E+06	--	--	--	--	--	--	**--**	**--**	**8.6E+06**
Phosphorus (Elemental)	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Pyrene	0	--	--	4.0E+03	--	--	4.0E+04	--	--	--	--	--	--	**--**	**--**	**4.0E+04**
Selenium	0	2.9E+02	7.1E+01	4.2E+03	5.8E+02	7.1E+02	4.2E+04	--	--	--	--	--	--	**5.8E+02**	**7.1E+02**	**4.2E+04**
Silver	0	1.9E+00	--	--	3.8E+00	--	--	--	--	--	--	--	--	**3.8E+00**	**--**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	4.0E+01	--	--	4.0E+02	--	--	--	--	--	--	**--**	**--**	**4.0E+02**
Tetrachloroethylene[C]	0	--	--	3.3E+01	--	--	3.3E+02	--	--	--	--	--	--	**--**	**--**	**3.3E+02**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Thallium	0	--	--	4.7E-01	--	--	4.7E+00	--	--	--	--	--	--	**--**	**--**	**4.7E+00**
Toluene	0	--	--	6.0E+03	--	--	6.0E+04	--	--	--	--	--	--	**--**	**--**	**6.0E+04**
Toxaphene [C]	0	2.1E-01	2.0E-04	2.8E-03	4.2E-01	2.0E-03	2.8E-02	--	--	--	--	--	--	**4.2E-01**	**2.0E-03**	**2.8E-02**
Tributyltin	0	4.2E-01	7.4E-03	--	8.4E-01	7.4E-02	--	--	--	--	--	--	--	**8.4E-01**	**7.4E-02**	**--**
1,2,4-Trichlorobenzene	0	--	--	7.0E+01	--	--	7.0E+02	--	--	--	--	--	--	**--**	**--**	**7.0E+02**
1,1,2-Trichloroethane[C]	0	--	--	1.6E+02	--	--	1.6E+03	--	--	--	--	--	--	**--**	**--**	**1.6E+03**
Trichloroethylene [C]	0	--	--	3.0E+02	--	--	3.0E+03	--	--	--	--	--	--	**--**	**--**	**3.0E+03**
2,4,6-Trichlorophenol [C]	0	--	--	2.4E+01	--	--	2.4E+02	--	--	--	--	--	--	**--**	**--**	**2.4E+02**
Vinyl Chloride[C]	0	--	--	2.4E+01	--	--	2.4E+02	--	--	--	--	--	--	**--**	**--**	**2.4E+02**
Zinc	0	9.0E+01	8.1E+01	2.6E+04	1.8E+02	8.1E+02	2.6E+05	--	--	--	--	--	--	**1.8E+02**	**8.1E+02**	**2.6E+05**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. For transition zone waters, spreadsheet prints the lesser of the freshwater and saltwater water quality criteria.
6. Regular WLA = (WQC x WLA multiplier) - (WLA multiplier - 1)(background conc.)
7. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
8. Antideg. WLA = (Antideg. Baseline)(WLA multiplier) - (WLA multiplier - 1)(background conc.)

Metal	Site Specific Target Value (SSTV)
Antimony	6.4E+03
Arsenic III	5.5E+01
Cadmium	3.2E+01
Chromium III	#VALUE!
Chromium VI	3.0E+02
Copper	7.4E+00
Lead	5.6E+01
Mercury	1.4E+00
Nickel	4.9E+01
Selenium	2.3E+02
Silver	1.5E+00
Zinc	7.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Temperature Screening: (Non-heated Discharge)

NOTE: The temperature screening at right evaluates the projected rise in temperature within the mixing zone during low flow conditions using 90%tile effluent temperature, and either 10%tile ambient temperature for heated discharges or 90%tile ambient temperature for non-heated discharges . If the projected rise in temperature exceeds the temperature standard, further evaluation is needed.

Acute - Maximum Allowable Rise Over Ambient = **2 ˚C**

Acute Mix Temperature (Non-heated Discharge)

$$\frac{((0.03\ \text{MGD} \times 27^{\circ}\text{C}) + (0.03\ \text{MGD} \times 29.1^{\circ}\text{C}))}{(0.06\ \text{MGD})} = 28.05\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 28.05 ˚C - 27˚C = **1.05 ˚C**

STATS Evaluation Needed? **NO**

Chronic - Maximum Allowable Rise Over Ambient = **3 ˚C**

Chronic Mix Temperature (Non-heated Discharge)

$$\frac{((0.27\ \text{MGD} \times 27^{\circ}\text{C}) + (0.03\ \text{MGD} \times 29.1^{\circ}\text{C}))}{(0.3\ \text{MGD})} = 27.21\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 27.21 ˚C - 27˚C = **0.21 ˚C**

STATS Evaluation Needed? **NO**

SALTWATER AND TRANSITION ZONES
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

0.040 MGD Plant
2012 Permit Reissuance

Facility Name: Windmill Point Resort & Yacht Harbor WWTP Permit No.: VA0060569
Receiving Stream: Windmill Point Boat Basin, tributary of Rappahannock River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	N/A	mg/l
90th % Temperature (Annual) =	27	(° C)
10th % Temperature (Annual) =	5.4	(° C)
90th % Temperature (Winter) =	N/A	(° C)
90th % Maximum pH =	8.2	
10th % Maximum pH =	7.4	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	16.15	(g/kg)

Mixing Information

Design Flow (MGD)	**0.04**
Acute WLA multiplier	2
Chronic WLA multiplier	10
Human health WLA multiplier	10

Effluent Information

Mean Hardness (as CaCO3) =	N/A	mg/L
90 % Temperature (Annual) =	29.1	(° C)
90 % Temperature (Winter) =	15.2	(° C)
90 % Maximum pH =	7.5	SU
10 % Maximum pH =	7	SU
Heated Discharge? (Y/N)	N	
Discharge Flow =	**0.03**	MGD

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Acenapthene	0	--	--	9.9E+02	--	--	9.9E+03	--	--	--	--	--	--	**--**	**--**	**9.9E+03**
Acrolein	0	--	--	9.3E+00	--	--	9.3E+01	--	--	--	--	--	--	**--**	**--**	**9.3E+01**
Acrylonitrile[C]	0	--	--	2.5E+00	--	--	2.5E+01	--	--	--	--	--	--	**--**	**--**	**2.5E+01**
Aldrin [C]	0	1.3E+00	--	5.0E-04	2.6E+00	--	5.0E-03	--	--	--	--	--	--	**2.6E+00**	**--**	**5.0E-03**
Ammonia-N (mg/l) - Annual	0	5.55E+00	4.45E-01	--	1.11E+01	4.45E+00	--	--	--	--	--	--	--	**1.11E+01**	**4.45E+00**	**--**
Ammonia-N (mg/l) - Winter	0	#VALUE!	#VALUE!	--	#VALUE!	#VALUE!	--	--	--	--	--	--	--	**#VALUE!**	**#VALUE!**	**--**
Anthracene	0	--	--	4.0E+04	--	--	4.0E+05	--	--	--	--	--	--	**--**	**--**	**4.0E+05**
Antimony	0	--	--	6.4E+02	--	--	6.4E+03	--	--	--	--	--	--	**--**	**--**	**6.4E+03**
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	3.6E+02	--	--	--	--	--	--	--	**1.4E+02**	**3.6E+02**	**--**
Benzene [C]	0	--	--	5.1E+02	--	--	5.1E+03	--	--	--	--	--	--	**--**	**--**	**5.1E+03**
Benzidine[C]	0	--	--	2.0E-03	--	--	2.0E-02	--	--	--	--	--	--	**--**	**--**	**2.0E-02**
Benzo (a) anthracene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (b) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (k) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (a) pyrene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Bis2-Chloroethyl Ether[C]	0	--	--	5.3E+00	--	--	5.3E+01	--	--	--	--	--	--	**--**	**--**	**5.3E+01**
Bis2-Chloroisopropyl Ether	0	--	--	6.5E+04	--	--	6.5E+05	--	--	--	--	--	--	**--**	**--**	**6.5E+05**
Bis2-Ethylhexyl Phthalate[C]	0	--	--	2.2E+01	--	--	2.2E+02	--	--	--	--	--	--	**--**	**--**	**2.2E+02**
Bromoform [C]	0	--	--	1.4E+03	--	--	1.4E+04	--	--	--	--	--	--	**--**	**--**	**1.4E+04**
Butylbenzylphthalate	0	--	--	1.9E+03	--	--	1.9E+04	--	--	--	--	--	--	**--**	**--**	**1.9E+04**
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	8.8E+01	--	--	--	--	--	--	--	**8.0E+01**	**8.8E+01**	**--**
Carbon Tetrachloride [C]	0	--	--	1.6E+01	--	--	1.6E+02	--	--	--	--	--	--	**--**	**--**	**1.6E+02**
Chlordane [C]	0	9.0E-02	4.0E-03	8.1E-03	1.8E-01	4.0E-02	8.1E-02	--	--	--	--	--	--	**1.8E-01**	**4.0E-02**	**8.1E-02**
TRC	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	7.5E+01	--	--	--	--	--	--	--	**2.6E+01**	**7.5E+01**	**--**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Chlorobenzene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**
Chlorodibromomethane[C]	0	--	--	1.3E+02	--	--	1.3E+03	--	--	--	--	--	--	**--**	**--**	**1.3E+03**
Chloroform	0	--	--	1.1E+04	--	--	1.1E+05	--	--	--	--	--	--	**--**	**--**	**1.1E+05**
2-Chloronaphthalene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**
2-Chlorophenol	0	--	--	1.5E+02	--	--	1.5E+03	--	--	--	--	--	--	**--**	**--**	**1.5E+03**
Chlorpyrifos	0	1.1E-02	5.6E-03	--	2.2E-02	5.6E-02	--	--	--	--	--	--	--	**2.2E-02**	**5.6E-02**	**--**
Chromium III	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chromium VI	0	1.1E+03	5.0E+01	--	2.2E+03	5.0E+02	--	--	--	--	--	--	--	**2.2E+03**	**5.0E+02**	**--**
Chrysene[C]	0	--	--	1.8E-02	--	--	1.8E-01	--	--	--	--	--	--	**--**	**--**	**1.8E-01**
Copper	0	9.3E+00	6.0E+00	--	1.9E+01	6.0E+01	--	--	--	--	--	--	--	**1.9E+01**	**6.0E+01**	**--**
Cyanide, Free	0	1.0E+00	1.0E+00	1.6E+04	2.0E+00	1.0E+01	1.6E+05	--	--	--	--	--	--	**2.0E+00**	**1.0E+01**	**1.6E+05**
DDD[C]	0	--	--	3.1E-03	--	--	3.1E-02	--	--	--	--	--	--	**--**	**--**	**3.1E-02**
DDE[C]	0	--	--	2.2E-03	--	--	2.2E-02	--	--	--	--	--	--	**--**	**--**	**2.2E-02**
DDT[C]	0	1.3E-01	1.0E-03	2.2E-03	2.6E-01	1.0E-02	2.2E-02	--	--	--	--	--	--	**2.6E-01**	**1.0E-02**	**2.2E-02**
Demeton	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Diazinon	0	8.2E-01	8.2E-01	--	1.6E+00	8.2E+00	--	--	--	--	--	--	--	**1.6E+00**	**8.2E+00**	**--**
Dibenz(a,h)anthracene[C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
1,2-Dichlorobenzene	0	--	--	1.3E+03	--	--	1.3E+04	--	--	--	--	--	--	**--**	**--**	**1.3E+04**
1,3-Dichlorobenzene	0	--	--	9.6E+02	--	--	9.6E+03	--	--	--	--	--	--	**--**	**--**	**9.6E+03**
1,4-Dichlorobenzene	0	--	--	1.9E+02	--	--	1.9E+03	--	--	--	--	--	--	**--**	**--**	**1.9E+03**
3,3-Dichlorobenzidine[C]	0	--	--	2.8E-01	--	--	2.8E+00	--	--	--	--	--	--	**--**	**--**	**2.8E+00**
Dichlorobromomethane[C]	0	--	--	1.7E+02	--	--	1.7E+03	--	--	--	--	--	--	**--**	**--**	**1.7E+03**
1,2-Dichloroethane[C]	0	--	--	3.7E+02	--	--	3.7E+03	--	--	--	--	--	--	**--**	**--**	**3.7E+03**
1,1-Dichloroethylene	0	--	--	7.1E+03	--	--	7.1E+04	--	--	--	--	--	--	**--**	**--**	**7.1E+04**
1,2-trans-dichloroethylene	0	--	--	1.0E+04	--	--	1.0E+05	--	--	--	--	--	--	**--**	**--**	**1.0E+05**
2,4-Dichlorophenol	0	--	--	2.9E+02	--	--	2.9E+03	--	--	--	--	--	--	**--**	**--**	**2.9E+03**
1,2-Dichloropropane[C]	0	--	--	1.5E+02	--	--	1.5E+03	--	--	--	--	--	--	**--**	**--**	**1.5E+03**
1,3-Dichloropropene[C]	0	--	--	2.1E+02	--	--	2.1E+03	--	--	--	--	--	--	**--**	**--**	**2.1E+03**
Dieldrin[C]	0	7.1E-01	1.9E-03	5.4E-04	1.4E+00	1.9E-02	5.4E-03	--	--	--	--	--	--	**1.4E+00**	**1.9E-02**	**5.4E-03**
Diethyl Phthalate	0	--	--	4.4E+04	--	--	4.4E+05	--	--	--	--	--	--	**--**	**--**	**4.4E+05**
2,4-Dimethylphenol	0	--	--	8.5E+02	--	--	8.5E+03	--	--	--	--	--	--	**--**	**--**	**8.5E+03**
Dimethyl Phthalate	0	--	--	1.1E+06	--	--	1.1E+07	--	--	--	--	--	--	**--**	**--**	**1.1E+07**
Di-n-Butyl Phthalate	0	--	--	4.5E+03	--	--	4.5E+04	--	--	--	--	--	--	**--**	**--**	**4.5E+04**
2,4 Dinitrophenol	0	--	--	5.3E+03	--	--	5.3E+04	--	--	--	--	--	--	**--**	**--**	**5.3E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	2.8E+02	--	--	2.8E+03	--	--	--	--	--	--	**--**	**--**	**2.8E+03**
2,4-Dinitrotoluene[C]	0	--	--	3.4E+01	--	--	3.4E+02	--	--	--	--	--	--	**--**	**--**	**3.4E+02**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	5.1E-08	--	--	5.1E-07	--	--	--	--	--	--	**--**	**--**	**5.1E-07**
1,2-Diphenylhydrazine[C]	0	--	--	2.0E+00	--	--	2.0E+01	--	--	--	--	--	--	**--**	**--**	**2.0E+01**
Alpha-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	8.7E-02	8.9E+02	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**8.9E+02**
Beta-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	8.7E-02	8.9E+02	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**8.9E+02**
Alpha + Beta Endosulfan	0	3.4E-02	8.7E-03	--	6.8E-02	8.7E-02	--	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**--**
Endosulfan Sulfate	0	--	--	8.9E+01	--	--	8.9E+02	--	--	--	--	--	--	**--**	**--**	**8.9E+02**
Endrin	0	3.7E-02	2.3E-03	6.0E-02	7.4E-02	2.3E-02	6.0E-01	--	--	--	--	--	--	**7.4E-02**	**2.3E-02**	**6.0E-01**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Endrin Aldehyde	0	--	--	3.0E-01	--	--	3.0E+00	--	--	--	--	--	--	**--**	**--**	**3.0E+00**
Ethylbenzene	0	--	--	2.1E+03	--	--	2.1E+04	--	--	--	--	--	--	**--**	**--**	**2.1E+04**
Fluoranthene	0	--	--	1.4E+02	--	--	1.4E+03	--	--	--	--	--	--	**--**	**--**	**1.4E+03**
Fluorene	0	--	--	5.3E+03	--	--	5.3E+04	--	--	--	--	--	--	**--**	**--**	**5.3E+04**
Guthion	0	--	1.0E-02	--	--	1.0E-01	--	--	--	--	--	--	--	**--**	**1.0E-01**	**--**
Heptachlor [C]	0	5.3E-02	3.6E-03	7.9E-04	1.1E-01	3.6E-02	7.9E-03	--	--	--	--	--	--	**1.1E-01**	**3.6E-02**	**7.9E-03**
Heptachlor Epoxide[C]	0	5.3E-02	3.6E-03	3.9E-04	1.1E-01	3.6E-02	3.9E-03	--	--	--	--	--	--	**1.1E-01**	**3.6E-02**	**3.9E-03**
Hexachlorobenzene[C]	0	--	--	2.9E-03	--	--	2.9E-02	--	--	--	--	--	--	**--**	**--**	**2.9E-02**
Hexachlorobutadiene[C]	0	--	--	1.8E+02	--	--	1.8E+03	--	--	--	--	--	--	**--**	**--**	**1.8E+03**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	4.9E-02	--	--	4.9E-01	--	--	--	--	--	--	**--**	**--**	**4.9E-01**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	1.7E-01	--	--	1.7E+00	--	--	--	--	--	--	**--**	**--**	**1.7E+00**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	1.6E-01	--	1.8E+00	3.2E-01	--	1.8E+01	--	--	--	--	--	--	**3.2E-01**	**--**	**1.8E+01**
Hexachlorocyclopentadiene	0	--	--	1.1E+03	--	--	1.1E+04	--	--	--	--	--	--	**--**	**--**	**1.1E+04**
Hexachloroethane[C]	0	--	--	3.3E+01	--	--	3.3E+02	--	--	--	--	--	--	**--**	**--**	**3.3E+02**
Hydrogen Sulfide	0	--	2.0E+00	--	--	2.0E+01	--	--	--	--	--	--	--	**--**	**2.0E+01**	**--**
Indeno (1,2,3-cd) pyrene C	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Isophorone[C]	0	--	--	9.6E+03	--	--	9.6E+04	--	--	--	--	--	--	**--**	**--**	**9.6E+04**
Kepone	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	**--**	**0.0E+00**	**--**
Lead	0	2.4E+02	9.3E+00	--	4.8E+02	9.3E+01	--	--	--	--	--	--	--	**4.8E+02**	**9.3E+01**	**--**
Malathion	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Mercury	0	1.8E+00	9.4E-01	--	3.6E+00	9.4E+00	--	--	--	--	--	--	--	**3.6E+00**	**9.4E+00**	**--**
Methyl Bromide	0	--	--	1.5E+03	--	--	1.5E+04	--	--	--	--	--	--	**--**	**--**	**1.5E+04**
Methylene Chloride [C]	0	--	--	5.9E+03	--	--	5.9E+04	--	--	--	--	--	--	**--**	**--**	**5.9E+04**
Methoxychlor	0	--	3.0E-02	--	--	3.0E-01	--	--	--	--	--	--	--	**--**	**3.0E-01**	**--**
Mirex	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	**--**	**0.0E+00**	**--**
Nickel	0	7.4E+01	8.2E+00	4.6E+03	1.5E+02	8.2E+01	4.6E+04	--	--	--	--	--	--	**1.5E+02**	**8.2E+01**	**4.6E+04**
Nitrobenzene	0	--	--	6.9E+02	--	--	6.9E+03	--	--	--	--	--	--	**--**	**--**	**6.9E+03**
N-Nitrosodimethylamine[C]	0	--	--	3.0E+01	--	--	3.0E+02	--	--	--	--	--	--	**--**	**--**	**3.0E+02**
N-Nitrosodiphenylamine[C]	0	--	--	6.0E+01	--	--	6.0E+02	--	--	--	--	--	--	**--**	**--**	**6.0E+02**
N-Nitrosodi-n-propylamine[C]	0	--	--	5.1E+00	--	--	5.1E+01	--	--	--	--	--	--	**--**	**--**	**5.1E+01**
Nonylphenol	0	7.0E+00	1.7E+00	--	1.4E+01	1.7E+01	--	--	--	--	--	--	--	**1.4E+01**	**1.7E+01**	**--**
Parathion	0	--	--	--	--	--	--	--	--	--	--	--	--	**--**	**--**	**--**
PCB Total[C]	0	--	3.0E-02	6.4E-04	--	3.0E-01	6.4E-03	--	--	--	--	--	--	**--**	**3.0E-01**	**6.4E-03**
Pentachlorophenol [C]	0	1.3E+01	7.9E+00	3.0E+01	2.6E+01	7.9E+01	3.0E+02	--	--	--	--	--	--	**2.6E+01**	**7.9E+01**	**3.0E+02**
Phenol	0	--	--	8.6E+05	--	--	8.6E+06	--	--	--	--	--	--	**--**	**--**	**8.6E+06**
Phosphorus (Elemental)	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Pyrene	0	--	--	4.0E+03	--	--	4.0E+04	--	--	--	--	--	--	**--**	**--**	**4.0E+04**
Selenium	0	2.9E+02	7.1E+01	4.2E+03	5.8E+02	7.1E+02	4.2E+04	--	--	--	--	--	--	**5.8E+02**	**7.1E+02**	**4.2E+04**
Silver	0	1.9E+00	--	--	3.8E+00	--	--	--	--	--	--	--	--	**3.8E+00**	**--**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	4.0E+01	--	--	4.0E+02	--	--	--	--	--	--	**--**	**--**	**4.0E+02**
Tetrachloroethylene[C]	0	--	--	3.3E+01	--	--	3.3E+02	--	--	--	--	--	--	**--**	**--**	**3.3E+02**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Thallium	0	--	--	4.7E-01	--	--	4.7E+00	--	--	--	--	--	--	**--**	**--**	**4.7E+00**
Toluene	0	--	--	6.0E+03	--	--	6.0E+04	--	--	--	--	--	--	**--**	**--**	**6.0E+04**
Toxaphene [C]	0	2.1E-01	2.0E-04	2.8E-03	4.2E-01	2.0E-03	2.8E-02	--	--	--	--	--	--	**4.2E-01**	**2.0E-03**	**2.8E-02**
Tributyltin	0	4.2E-01	7.4E-03	--	8.4E-01	7.4E-02	--	--	--	--	--	--	--	**8.4E-01**	**7.4E-02**	**--**
1,2,4-Trichlorobenzene	0	--	--	7.0E+01	--	--	7.0E+02	--	--	--	--	--	--	**--**	**--**	**7.0E+02**
1,1,2-Trichloroethane[C]	0	--	--	1.6E+02	--	--	1.6E+03	--	--	--	--	--	--	**--**	**--**	**1.6E+03**
Trichloroethylene [C]	0	--	--	3.0E+02	--	--	3.0E+03	--	--	--	--	--	--	**--**	**--**	**3.0E+03**
2,4,6-Trichlorophenol [C]	0	--	--	2.4E+01	--	--	2.4E+02	--	--	--	--	--	--	**--**	**--**	**2.4E+02**
Vinyl Chloride[C]	0	--	--	2.4E+01	--	--	2.4E+02	--	--	--	--	--	--	**--**	**--**	**2.4E+02**
Zinc	0	9.0E+01	8.1E+01	2.6E+04	1.8E+02	8.1E+02	2.6E+05	--	--	--	--	--	--	**1.8E+02**	**8.1E+02**	**2.6E+05**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. For transition zone waters, spreadsheet prints the lesser of the freshwater and saltwater water quality criteria.
6. Regular WLA = (WQC x WLA multiplier) - (WLA multiplier - 1)(background conc.)
7. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
8. Antideg. WLA = (Antideg. Baseline)(WLA multiplier) - (WLA multiplier - 1)(background conc.)

Metal	Site Specific Target Value (SSTV)
Antimony	6.4E+03
Arsenic III	5.5E+01
Cadmium	3.2E+01
Chromium III	#VALUE!
Chromium VI	3.0E+02
Copper	7.4E+00
Lead	5.6E+01
Mercury	1.4E+00
Nickel	4.9E+01
Selenium	2.3E+02
Silver	1.5E+00
Zinc	7.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Temperature Screening: (Non-heated Discharge)

NOTE: The temperature screening at right evaluates the projected rise in temperature within the mixing zone during low flow conditions using 90%tile effluent temperature, and either 10%tile ambient temperature for heated discharges or 90%tile ambient temperature for non-heated discharges . If the projected rise in temperature exceeds the temperature standard, further evaluation is needed.

Acute - Maximum Allowable Rise Over Ambient = **2 ˚C**

Acute Mix Temperature (Non-heated Discharge)

$$\frac{((0.03\ \text{MGD} \times 27^{\circ}\text{C}) + (0.03\ \text{MGD} \times 29.1^{\circ}\text{C}))}{(0.06\ \text{MGD})} = 28.05\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 28.05 ˚C - 27˚C = **1.05 ˚C**

STATS Evaluation Needed? **NO**

Chronic - Maximum Allowable Rise Over Ambient = **3 ˚C**

Chronic Mix Temperature (Non-heated Discharge)

$$\frac{((0.27\ \text{MGD} \times 27^{\circ}\text{C}) + (0.03\ \text{MGD} \times 29.1^{\circ}\text{C}))}{(0.3\ \text{MGD})} = 27.21\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 27.21 ˚C - 27˚C = **0.21 ˚C**

STATS Evaluation Needed? **NO**

SALTWATER AND TRANSITION ZONES
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

0.080 MGD Plant
2012 Permit Reissuance

Facility Name: Windmill Point Resort & Yacht Harbor WWTP Permit No.: VA0060569
Receiving Stream: Windmill Point Boat Basin, tributary of Rappahannock River

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	N/A	mg/l
90th % Temperature (Annual) =	27	(° C)
10th % Temperature (Annual) =	5.4	(° C)
90th % Temperature (Winter) =	N/A	(° C)
90th % Maximum pH =	8.2	
10th % Maximum pH =	7.4	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	16.15	(g/kg)

Mixing Information

Design Flow (MGD)	**0.08**
Acute WLA multiplier	2
Chronic WLA multiplier	10
Human health WLA multiplier	10

Effluent Information

Mean Hardness (as CaCO3) =	N/A	mg/L
90 % Temperature (Annual) =	29.1	(° C)
90 % Temperature (Winter) =	15.2	(° C)
90 % Maximum pH =	7.5	SU
10 % Maximum pH =	7	SU
Heated Discharge? (Y/N)	N	
Discharge Flow =	**0.03**	MGD

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Acenapthene	0	--	--	9.9E+02	--	--	9.9E+03	--	--	--	--	--	--	**--**	**--**	**9.9E+03**
Acrolein	0	--	--	9.3E+00	--	--	9.3E+01	--	--	--	--	--	--	**--**	**--**	**9.3E+01**
Acrylonitrile[C]	0	--	--	2.5E+00	--	--	2.5E+01	--	--	--	--	--	--	**--**	**--**	**2.5E+01**
Aldrin [C]	0	1.3E+00	--	5.0E-04	2.6E+00	--	5.0E-03	--	--	--	--	--	--	**2.6E+00**	**--**	**5.0E-03**
Ammonia-N (mg/l) - Annual	0	5.55E+00	4.45E-01	--	1.11E+01	4.45E+00	--	--	--	--	--	--	--	**1.11E+01**	**4.45E+00**	**--**
Ammonia-N (mg/l) - Winter	0	#VALUE!	#VALUE!	--	#VALUE!	#VALUE!	--	--	--	--	--	--	--	**#VALUE!**	**#VALUE!**	**--**
Anthracene	0	--	--	4.0E+04	--	--	4.0E+05	--	--	--	--	--	--	**--**	**--**	**4.0E+05**
Antimony	0	--	--	6.4E+02	--	--	6.4E+03	--	--	--	--	--	--	**--**	**--**	**6.4E+03**
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	3.6E+02	--	--	--	--	--	--	--	**1.4E+02**	**3.6E+02**	**--**
Benzene [C]	0	--	--	5.1E+02	--	--	5.1E+03	--	--	--	--	--	--	**--**	**--**	**5.1E+03**
Benzidine[C]	0	--	--	2.0E-03	--	--	2.0E-02	--	--	--	--	--	--	**--**	**--**	**2.0E-02**
Benzo (a) anthracene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (b) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (k) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (a) pyrene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Bis2-Chloroethyl Ether[C]	0	--	--	5.3E+00	--	--	5.3E+01	--	--	--	--	--	--	**--**	**--**	**5.3E+01**
Bis2-Chloroisopropyl Ether	0	--	--	6.5E+04	--	--	6.5E+05	--	--	--	--	--	--	**--**	**--**	**6.5E+05**
Bis2-Ethylhexyl Phthalate[C]	0	--	--	2.2E+01	--	--	2.2E+02	--	--	--	--	--	--	**--**	**--**	**2.2E+02**
Bromoform [C]	0	--	--	1.4E+03	--	--	1.4E+04	--	--	--	--	--	--	**--**	**--**	**1.4E+04**
Butylbenzylphthalate	0	--	--	1.9E+03	--	--	1.9E+04	--	--	--	--	--	--	**--**	**--**	**1.9E+04**
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	8.8E+01	--	--	--	--	--	--	--	**8.0E+01**	**8.8E+01**	**--**
Carbon Tetrachloride [C]	0	--	--	1.6E+01	--	--	1.6E+02	--	--	--	--	--	--	**--**	**--**	**1.6E+02**
Chlordane [C]	0	9.0E-02	4.0E-03	8.1E-03	1.8E-01	4.0E-02	8.1E-02	--	--	--	--	--	--	**1.8E-01**	**4.0E-02**	**8.1E-02**
TRC	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	7.5E+01	--	--	--	--	--	--	--	**2.6E+01**	**7.5E+01**	**--**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Chlorobenzene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**
Chlorodibromomethane[C]	0	--	--	1.3E+02	--	--	1.3E+03	--	--	--	--	--	--	**--**	**--**	**1.3E+03**
Chloroform	0	--	--	1.1E+04	--	--	1.1E+05	--	--	--	--	--	--	**--**	**--**	**1.1E+05**
2-Chloronaphthalene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**
2-Chlorophenol	0	--	--	1.5E+02	--	--	1.5E+03	--	--	--	--	--	--	**--**	**--**	**1.5E+03**
Chlorpyrifos	0	1.1E-02	5.6E-03	--	2.2E-02	5.6E-02	--	--	--	--	--	--	--	**2.2E-02**	**5.6E-02**	**--**
Chromium III	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chromium VI	0	1.1E+03	5.0E+01	--	2.2E+03	5.0E+02	--	--	--	--	--	--	--	**2.2E+03**	**5.0E+02**	**--**
Chrysene[C]	0	--	--	1.8E-02	--	--	1.8E-01	--	--	--	--	--	--	**--**	**--**	**1.8E-01**
Copper	0	9.3E+00	6.0E+00	--	1.9E+01	6.0E+01	--	--	--	--	--	--	--	**1.9E+01**	**6.0E+01**	**--**
Cyanide, Free	0	1.0E+00	1.0E+00	1.6E+04	2.0E+00	1.0E+01	1.6E+05	--	--	--	--	--	--	**2.0E+00**	**1.0E+01**	**1.6E+05**
DDD[C]	0	--	--	3.1E-03	--	--	3.1E-02	--	--	--	--	--	--	**--**	**--**	**3.1E-02**
DDE[C]	0	--	--	2.2E-03	--	--	2.2E-02	--	--	--	--	--	--	**--**	**--**	**2.2E-02**
DDT[C]	0	1.3E-01	1.0E-03	2.2E-03	2.6E-01	1.0E-02	2.2E-02	--	--	--	--	--	--	**2.6E-01**	**1.0E-02**	**2.2E-02**
Demeton	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Diazinon	0	8.2E-01	8.2E-01	--	1.6E+00	8.2E+00	--	--	--	--	--	--	--	**1.6E+00**	**8.2E+00**	**--**
Dibenz(a,h)anthracene[C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
1,2-Dichlorobenzene	0	--	--	1.3E+03	--	--	1.3E+04	--	--	--	--	--	--	**--**	**--**	**1.3E+04**
1,3-Dichlorobenzene	0	--	--	9.6E+02	--	--	9.6E+03	--	--	--	--	--	--	**--**	**--**	**9.6E+03**
1,4-Dichlorobenzene	0	--	--	1.9E+02	--	--	1.9E+03	--	--	--	--	--	--	**--**	**--**	**1.9E+03**
3,3-Dichlorobenzidine[C]	0	--	--	2.8E-01	--	--	2.8E+00	--	--	--	--	--	--	**--**	**--**	**2.8E+00**
Dichlorobromomethane[C]	0	--	--	1.7E+02	--	--	1.7E+03	--	--	--	--	--	--	**--**	**--**	**1.7E+03**
1,2-Dichloroethane[C]	0	--	--	3.7E+02	--	--	3.7E+03	--	--	--	--	--	--	**--**	**--**	**3.7E+03**
1,1-Dichloroethylene	0	--	--	7.1E+03	--	--	7.1E+04	--	--	--	--	--	--	**--**	**--**	**7.1E+04**
1,2-trans-dichloroethylene	0	--	--	1.0E+04	--	--	1.0E+05	--	--	--	--	--	--	**--**	**--**	**1.0E+05**
2,4-Dichlorophenol	0	--	--	2.9E+02	--	--	2.9E+03	--	--	--	--	--	--	**--**	**--**	**2.9E+03**
1,2-Dichloropropane[C]	0	--	--	1.5E+02	--	--	1.5E+03	--	--	--	--	--	--	**--**	**--**	**1.5E+03**
1,3-Dichloropropene[C]	0	--	--	2.1E+02	--	--	2.1E+03	--	--	--	--	--	--	**--**	**--**	**2.1E+03**
Dieldrin[C]	0	7.1E-01	1.9E-03	5.4E-04	1.4E+00	1.9E-02	5.4E-03	--	--	--	--	--	--	**1.4E+00**	**1.9E-02**	**5.4E-03**
Diethyl Phthalate	0	--	--	4.4E+04	--	--	4.4E+05	--	--	--	--	--	--	**--**	**--**	**4.4E+05**
2,4-Dimethylphenol	0	--	--	8.5E+02	--	--	8.5E+03	--	--	--	--	--	--	**--**	**--**	**8.5E+03**
Dimethyl Phthalate	0	--	--	1.1E+06	--	--	1.1E+07	--	--	--	--	--	--	**--**	**--**	**1.1E+07**
Di-n-Butyl Phthalate	0	--	--	4.5E+03	--	--	4.5E+04	--	--	--	--	--	--	**--**	**--**	**4.5E+04**
2,4 Dinitrophenol	0	--	--	5.3E+03	--	--	5.3E+04	--	--	--	--	--	--	**--**	**--**	**5.3E+04**
2-Methyl-4,6-Dinitrophenol	0	--	--	2.8E+02	--	--	2.8E+03	--	--	--	--	--	--	**--**	**--**	**2.8E+03**
2,4-Dinitrotoluene[C]	0	--	--	3.4E+01	--	--	3.4E+02	--	--	--	--	--	--	**--**	**--**	**3.4E+02**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	5.1E-08	--	--	5.1E-07	--	--	--	--	--	--	**--**	**--**	**5.1E-07**
1,2-Diphenylhydrazine[C]	0	--	--	2.0E+00	--	--	2.0E+01	--	--	--	--	--	--	**--**	**--**	**2.0E+01**
Alpha-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	8.7E-02	8.9E+02	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**8.9E+02**
Beta-Endosulfan	0	3.4E-02	8.7E-03	8.9E+01	6.8E-02	8.7E-02	8.9E+02	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**8.9E+02**
Alpha + Beta Endosulfan	0	3.4E-02	8.7E-03	--	6.8E-02	8.7E-02	--	--	--	--	--	--	--	**6.8E-02**	**8.7E-02**	**--**
Endosulfan Sulfate	0	--	--	8.9E+01	--	--	8.9E+02	--	--	--	--	--	--	**--**	**--**	**8.9E+02**
Endrin	0	3.7E-02	2.3E-03	6.0E-02	7.4E-02	2.3E-02	6.0E-01	--	--	--	--	--	--	**7.4E-02**	**2.3E-02**	**6.0E-01**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Endrin Aldehyde	0	--	--	3.0E-01	--	--	3.0E+00	--	--	--	--	--	--	**--**	**--**	**3.0E+00**
Ethylbenzene	0	--	--	2.1E+03	--	--	2.1E+04	--	--	--	--	--	--	**--**	**--**	**2.1E+04**
Fluoranthene	0	--	--	1.4E+02	--	--	1.4E+03	--	--	--	--	--	--	**--**	**--**	**1.4E+03**
Fluorene	0	--	--	5.3E+03	--	--	5.3E+04	--	--	--	--	--	--	**--**	**--**	**5.3E+04**
Guthion	0	--	1.0E-02	--	--	1.0E-01	--	--	--	--	--	--	--	**--**	**1.0E-01**	**--**
Heptachlor [C]	0	5.3E-02	3.6E-03	7.9E-04	1.1E-01	3.6E-02	7.9E-03	--	--	--	--	--	--	**1.1E-01**	**3.6E-02**	**7.9E-03**
Heptachlor Epoxide[C]	0	5.3E-02	3.6E-03	3.9E-04	1.1E-01	3.6E-02	3.9E-03	--	--	--	--	--	--	**1.1E-01**	**3.6E-02**	**3.9E-03**
Hexachlorobenzene[C]	0	--	--	2.9E-03	--	--	2.9E-02	--	--	--	--	--	--	**--**	**--**	**2.9E-02**
Hexachlorobutadiene[C]	0	--	--	1.8E+02	--	--	1.8E+03	--	--	--	--	--	--	**--**	**--**	**1.8E+03**
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	4.9E-02	--	--	4.9E-01	--	--	--	--	--	--	**--**	**--**	**4.9E-01**
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	1.7E-01	--	--	1.7E+00	--	--	--	--	--	--	**--**	**--**	**1.7E+00**
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	1.6E-01	--	1.8E+00	3.2E-01	--	1.8E+01	--	--	--	--	--	--	**3.2E-01**	**--**	**1.8E+01**
Hexachlorocyclopentadiene	0	--	--	1.1E+03	--	--	1.1E+04	--	--	--	--	--	--	**--**	**--**	**1.1E+04**
Hexachloroethane[C]	0	--	--	3.3E+01	--	--	3.3E+02	--	--	--	--	--	--	**--**	**--**	**3.3E+02**
Hydrogen Sulfide	0	--	2.0E+00	--	--	2.0E+01	--	--	--	--	--	--	--	**--**	**2.0E+01**	**--**
Indeno (1,2,3-cd) pyrene C	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Isophorone[C]	0	--	--	9.6E+03	--	--	9.6E+04	--	--	--	--	--	--	**--**	**--**	**9.6E+04**
Kepone	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	**--**	**0.0E+00**	**--**
Lead	0	2.4E+02	9.3E+00	--	4.8E+02	9.3E+01	--	--	--	--	--	--	--	**4.8E+02**	**9.3E+01**	**--**
Malathion	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Mercury	0	1.8E+00	9.4E-01	--	3.6E+00	9.4E+00	--	--	--	--	--	--	--	**3.6E+00**	**9.4E+00**	**--**
Methyl Bromide	0	--	--	1.5E+03	--	--	1.5E+04	--	--	--	--	--	--	**--**	**--**	**1.5E+04**
Methylene Chloride [C]	0	--	--	5.9E+03	--	--	5.9E+04	--	--	--	--	--	--	**--**	**--**	**5.9E+04**
Methoxychlor	0	--	3.0E-02	--	--	3.0E-01	--	--	--	--	--	--	--	**--**	**3.0E-01**	**--**
Mirex	0	--	0.0E+00	--	--	0.0E+00	--	--	--	--	--	--	--	**--**	**0.0E+00**	**--**
Nickel	0	7.4E+01	8.2E+00	4.6E+03	1.5E+02	8.2E+01	4.6E+04	--	--	--	--	--	--	**1.5E+02**	**8.2E+01**	**4.6E+04**
Nitrobenzene	0	--	--	6.9E+02	--	--	6.9E+03	--	--	--	--	--	--	**--**	**--**	**6.9E+03**
N-Nitrosodimethylamine[C]	0	--	--	3.0E+01	--	--	3.0E+02	--	--	--	--	--	--	**--**	**--**	**3.0E+02**
N-Nitrosodiphenylamine[C]	0	--	--	6.0E+01	--	--	6.0E+02	--	--	--	--	--	--	**--**	**--**	**6.0E+02**
N-Nitrosodi-n-propylamine[C]	0	--	--	5.1E+00	--	--	5.1E+01	--	--	--	--	--	--	**--**	**--**	**5.1E+01**
Nonylphenol	0	7.0E+00	1.7E+00	--	1.4E+01	1.7E+01	--	--	--	--	--	--	--	**1.4E+01**	**1.7E+01**	**--**
Parathion	0	--	--	--	--	--	--	--	--	--	--	--	--	**--**	**--**	**--**
PCB Total[C]	0	--	3.0E-02	6.4E-04	--	3.0E-01	6.4E-03	--	--	--	--	--	--	**--**	**3.0E-01**	**6.4E-03**
Pentachlorophenol [C]	0	1.3E+01	7.9E+00	3.0E+01	2.6E+01	7.9E+01	3.0E+02	--	--	--	--	--	--	**2.6E+01**	**7.9E+01**	**3.0E+02**
Phenol	0	--	--	8.6E+05	--	--	8.6E+06	--	--	--	--	--	--	**--**	**--**	**8.6E+06**
Phosphorus (Elemental)	0	--	1.0E-01	--	--	1.0E+00	--	--	--	--	--	--	--	**--**	**1.0E+00**	**--**
Pyrene	0	--	--	4.0E+03	--	--	4.0E+04	--	--	--	--	--	--	**--**	**--**	**4.0E+04**
Selenium	0	2.9E+02	7.1E+01	4.2E+03	5.8E+02	7.1E+02	4.2E+04	--	--	--	--	--	--	**5.8E+02**	**7.1E+02**	**4.2E+04**
Silver	0	1.9E+00	--	--	3.8E+00	--	--	--	--	--	--	--	--	**3.8E+00**	**--**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	4.0E+01	--	--	4.0E+02	--	--	--	--	--	--	**--**	**--**	**4.0E+02**
Tetrachloroethylene[C]	0	--	--	3.3E+01	--	--	3.3E+02	--	--	--	--	--	--	**--**	**--**	**3.3E+02**

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Thallium	0	--	--	4.7E-01	--	--	4.7E+00	--	--	--	--	--	--	**--**	**--**	**4.7E+00**
Toluene	0	--	--	6.0E+03	--	--	6.0E+04	--	--	--	--	--	--	**--**	**--**	**6.0E+04**
Toxaphene [C]	0	2.1E-01	2.0E-04	2.8E-03	4.2E-01	2.0E-03	2.8E-02	--	--	--	--	--	--	**4.2E-01**	**2.0E-03**	**2.8E-02**
Tributyltin	0	4.2E-01	7.4E-03	--	8.4E-01	7.4E-02	--	--	--	--	--	--	--	**8.4E-01**	**7.4E-02**	**--**
1,2,4-Trichlorobenzene	0	--	--	7.0E+01	--	--	7.0E+02	--	--	--	--	--	--	**--**	**--**	**7.0E+02**
1,1,2-Trichloroethane[C]	0	--	--	1.6E+02	--	--	1.6E+03	--	--	--	--	--	--	**--**	**--**	**1.6E+03**
Trichloroethylene [C]	0	--	--	3.0E+02	--	--	3.0E+03	--	--	--	--	--	--	**--**	**--**	**3.0E+03**
2,4,6-Trichlorophenol [C]	0	--	--	2.4E+01	--	--	2.4E+02	--	--	--	--	--	--	**--**	**--**	**2.4E+02**
Vinyl Chloride[C]	0	--	--	2.4E+01	--	--	2.4E+02	--	--	--	--	--	--	**--**	**--**	**2.4E+02**
Zinc	0	9.0E+01	8.1E+01	2.6E+04	1.8E+02	8.1E+02	2.6E+05	--	--	--	--	--	--	**1.8E+02**	**8.1E+02**	**2.6E+05**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. For transition zone waters, spreadsheet prints the lesser of the freshwater and saltwater water quality criteria.
6. Regular WLA = (WQC x WLA multiplier) - (WLA multiplier - 1)(background conc.)
7. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
8. Antideg. WLA = (Antideg. Baseline)(WLA multiplier) - (WLA multiplier - 1)(background conc.)

Metal	Site Specific Target Value (SSTV)
Antimony	6.4E+03
Arsenic III	5.5E+01
Cadmium	3.2E+01
Chromium III	#VALUE!
Chromium VI	3.0E+02
Copper	7.4E+00
Lead	5.6E+01
Mercury	1.4E+00
Nickel	4.9E+01
Selenium	2.3E+02
Silver	1.5E+00
Zinc	7.2E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Temperature Screening: (Non-heated Discharge)

NOTE: The temperature screening at right evaluates the projected rise in temperature within the mixing zone during low flow conditions using 90%tile effluent temperature, and either 10%tile ambient temperature for heated discharges or 90%tile ambient temperature for non-heated discharges . If the projected rise in temperature exceeds the temperature standard, further evaluation is needed.

Acute - Maximum Allowable Rise Over Ambient = **2 ˚C**

Acute Mix Temperature (Non-heated Discharge)

$$\frac{((0.03\ \text{MGD} \times 27^{\circ}\text{C}) + (0.03\ \text{MGD} \times 29.1^{\circ}\text{C}))}{(0.06\ \text{MGD})} = 28.05\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 28.05 ˚C - 27˚C = **1.05 ˚C**

STATS Evaluation Needed? **NO**

Chronic - Maximum Allowable Rise Over Ambient = **3 ˚C**

Chronic Mix Temperature (Non-heated Discharge)

$$\frac{((0.27\ \text{MGD} \times 27^{\circ}\text{C}) + (0.03\ \text{MGD} \times 29.1^{\circ}\text{C}))}{(0.3\ \text{MGD})} = 27.21\ ^{\circ}\text{C}$$

ΔT ˚C above ambient ► 27.21 ˚C - 27˚C = **0.21 ˚C**

STATS Evaluation Needed? **NO**

2006 Permit Reissuance
VA0060569 - Windmill Point Resort & Yacht Harbor WWTP

SALTWATER AND TRANSITION ZONES
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Windmill Point Resort and Yacht Harbor, I Permit No.: VA0060569
Receiving Stream: Windmill Point Boat Basin (Rapp. River)

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	NA	mg/l
90th % Temperature (Annual) =	26.93	(° C)
90th % Temperature (Winter) =	NA-no tierin	(° C)
90th % Maximum pH =	8.28	
10th % Maximum pH =	7.42	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	16.28	(g/kg)

Mixing Information

Design Flow (MGD)	0.03
Acute WLA multiplier	2
Chronic WLA multiplier	10
Human health WLA multiplier	10

Effluent Information (From permit appl.)

Mean Hardness (as CaCO3) =	NA	mg/L
90 % Temperature (Annual) =	29.1	(° C)
90 % Temperature (Winter) =	NA-not tiere	(° C)
90 % Maximum pH =	8.8	SU
10 % Maximum pH =	NA	SU
Discharge Flow =	0.03	MGD

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			Most Limiting Allocations		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH
Acenapthene	0	--	--	2.7E+03	--	--	2.7E+04	--	--	--	--	--	--	--	--	2.7E+04
Acrolein		--	--	7.8E+02	--	--	7.8E+03	--	--	--	--	--	--	--	--	7.8E+03
Acrylonitrile [C]		--	--	6.6E+00	--	--	6.6E+01	--	--	--	--	--	--	--	--	6.6E+01
Aldrin [C]	0	1.3E+00	--	1.4E-03	2.6E+00	--	1.4E-02	--	--	--	--	--	--	2.6E+00	--	1.4E-02
Ammonia-N (mg/l) - Annual	0	1.2E+00	2.6E-01	--	2.3E+00	2.6E+00	--	--	--	--	--	--	--	2.3E+00	2.6E+00	--
Ammonia-N (mg/l) - Winter	0	#######	#######	--	#VALUE!	#VALUE!	--	--	--	--	--	--	--	#VALUE!	#VALUE!	--
Anthracene	0	--	--	1.1E+05	--	--	1.1E+06	--	--	--	--	--	--	--	--	1.1E+06
Antimony	0	--	--	4.3E+03	--	--	4.3E+04	--	--	--	--	--	--	--	--	4.3E+04
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	3.6E+02	--	--	--	--	--	--	--	1.4E+02	3.6E+02	--
Benzene [C]	0	--	--	7.1E+02	--	--	7.1E+03	--	--	--	--	--	--	--	--	7.1E+03
Benzidine [C]		--	--	5.4E-03	--	--	5.4E-02	--	--	--	--	--	--	--	--	5.4E-02
Benzo (a) anthracene [C]	0	--	--	4.9E-01	--	--	4.9E+00	--	--	--	--	--	--	--	--	4.9E+00
Benzo (b) fluoranthene [C]	0	--	--	4.9E-01	--	--	4.9E+00	--	--	--	--	--	--	--	--	4.9E+00
Benzo (k) fluoranthene [C]	0	--	--	4.9E-01	--	--	4.9E+00	--	--	--	--	--	--	--	--	4.9E+00
Benzo (a) pyrene [C]	0	--	--	4.9E-01	--	--	4.9E+00	--	--	--	--	--	--	--	--	4.9E+00
Bis2-Chloroethyl Ether		--	--	1.4E+01	--	--	1.4E+02	--	--	--	--	--	--	--	--	1.4E+02
Bis2-Chloroisopropyl Ether		--	--	1.7E+05	--	--	1.7E+06	--	--	--	--	--	--	--	--	1.7E+06
Bromoform [C]	0	--	--	3.6E+03	--	--	3.6E+04	--	--	--	--	--	--	--	--	3.6E+04
Butylbenzylphthalate	0	--	--	5.2E+03	--	--	5.2E+04	--	--	--	--	--	--	--	--	5.2E+04
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	8.8E+01	--	--	--	--	--	--	--	8.0E+01	8.8E+01	--
Carbon Tetrachloride [C]	0	--	--	4.4E+01	--	--	4.4E+02	--	--	--	--	--	--	--	--	4.4E+02
Chlordane [C]	0	9.0E-02	4.0E-03	2.2E-02	1.8E-01	4.0E-02	2.2E-01	--	--	--	--	--	--	1.8E-01	4.0E-02	2.2E-01
TRC	0			--			--	--	--	--	--	--	--	--	--	--
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	7.5E+01	--	--	--	--	--	--	--	2.6E+01	7.5E+01	--

SALTWATER AND TRANSITION ZONES
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Replication of 2006 MSTRANTI for calculating Ammonia WLAs to three significant figures.

Facility Name: Windmill Point Resort & Yacht Harbor WWTP Permit No.: VA0060569 Version: OWP Guid
Receiving Stream: Windmill Point Boat Basin, tributary of Rappahannock River

Stream Information		
Mean Hardness (as CaCO3) =	N/A	mg/l
90th % Temperature (Annual) =	26.93	(° C)
10th % Temperature (Annual) =		(° C)
90th % Temperature (Winter) =	N/A	(° C)
90th % Maximum pH =	8.28	
10th % Maximum pH =	7.42	
Tier Designation (1 or 2) =	1	
Early Life Stages Present Y/N =	Y	
Tidal Zone =	1	(1 = saltwater, 2 = transition zone)
Mean Salinity =	16.28	(g/kg)

Mixing Information	
Design Flow (MGD)	**0.03**
Acute WLA multiplier	2
Chronic WLA multiplier	10
Human health WLA multiplier	10

Effluent Information		
Mean Hardness (as CaCO3) =	N/A	mg/L
90 % Temperature (Annual) =	29.1	(° C)
90 % Temperature (Winter) =	N/A	(° C)
90 % Maximum pH =	8.8	SU
10 % Maximum pH =	N/A	SU
Heated Discharge? (Y/N)	N	
Discharge Flow =	**0.03**	MGD

Parameter	Background	Water Quality Criteria			Wasteload Allocations			Antidegradation Baseline			Antidegradation Allocations			**Most Limiting Allocations**		
(ug/l unless noted)	Conc.	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	Acute	Chronic	HH	**Acute**	**Chronic**	**HH**
Acenapthene	0	--	--	9.9E+02	--	--	9.9E+03	--	--	--	--	--	--	**--**	**--**	**9.9E+03**
Acrolein	0	--	--	9.3E+00	--	--	9.3E+01	--	--	--	--	--	--	**--**	**--**	**9.3E+01**
Acrylonitrile[C]	0	--	--	2.5E+00	--	--	2.5E+01	--	--	--	--	--	--	**--**	**--**	**2.5E+01**
Aldrin [C]	0	1.3E+00	--	5.0E-04	2.6E+00	--	5.0E-03	--	--	--	--	--	--	**2.6E+00**	**--**	**5.0E-03**
Ammonia-N (mg/l) - Annual	0	1.16E+00	2.60E-01	--	2.32E+00	2.60E+00	--	--	--	--	--	--	--	**2.32E+00**	**2.60E+00**	**--**
Ammonia-N (mg/l) - Winter	0	#VALUE!	#VALUE!	--	#VALUE!	#VALUE!	--	--	--	--	--	--	--	**#VALUE!**	**#VALUE!**	**--**
Anthracene	0	--	--	4.0E+04	--	--	4.0E+05	--	--	--	--	--	--	**--**	**--**	**4.0E+05**
Antimony	0	--	--	6.4E+02	--	--	6.4E+03	--	--	--	--	--	--	**--**	**--**	**6.4E+03**
Arsenic	0	6.9E+01	3.6E+01	--	1.4E+02	3.6E+02	--	--	--	--	--	--	--	**1.4E+02**	**3.6E+02**	**--**
Benzene [C]	0	--	--	5.1E+02	--	--	5.1E+03	--	--	--	--	--	--	**--**	**--**	**5.1E+03**
Benzidine[C]	0	--	--	2.0E-03	--	--	2.0E-02	--	--	--	--	--	--	**--**	**--**	**2.0E-02**
Benzo (a) anthracene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (b) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (k) fluoranthene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Benzo (a) pyrene [C]	0	--	--	1.8E-01	--	--	1.8E+00	--	--	--	--	--	--	**--**	**--**	**1.8E+00**
Bis2-Chloroethyl Ether[C]	0	--	--	5.3E+00	--	--	5.3E+01	--	--	--	--	--	--	**--**	**--**	**5.3E+01**
Bis2-Chloroisopropyl Ether	0	--	--	6.5E+04	--	--	6.5E+05	--	--	--	--	--	--	**--**	**--**	**6.5E+05**
Bis2-Ethylhexyl Phthalate[C]	0	--	--	2.2E+01	--	--	2.2E+02	--	--	--	--	--	--	**--**	**--**	**2.2E+02**
Bromoform [C]	0	--	--	1.4E+03	--	--	1.4E+04	--	--	--	--	--	--	**--**	**--**	**1.4E+04**
Butylbenzylphthalate	0	--	--	1.9E+03	--	--	1.9E+04	--	--	--	--	--	--	**--**	**--**	**1.9E+04**
Cadmium	0	4.0E+01	8.8E+00	--	8.0E+01	8.8E+01	--	--	--	--	--	--	--	**8.0E+01**	**8.8E+01**	**--**
Carbon Tetrachloride [C]	0	--	--	1.6E+01	--	--	1.6E+02	--	--	--	--	--	--	**--**	**--**	**1.6E+02**
Chlordane [C]	0	9.0E-02	4.0E-03	8.1E-03	1.8E-01	4.0E-02	8.1E-02	--	--	--	--	--	--	**1.8E-01**	**4.0E-02**	**8.1E-02**
TRC	0			--			--	--	--	--	--	--	--	**--**	**--**	**--**
Chlorine Prod. Oxidant	0	1.3E+01	7.5E+00	--	2.6E+01	7.5E+01	--	--	--	--	--	--	--	**2.6E+01**	**7.5E+01**	**--**
Chlorobenzene	0	--	--	1.6E+03	--	--	1.6E+04	--	--	--	--	--	--	**--**	**--**	**1.6E+04**

VA0060569 - AMMONIA-0.030 MGD

10/28/2011 9:41:35 AM

Facility = Windmill Point Resort & Yacht Harbor WWTP
Chemical = Ammonia
Chronic averaging period = 30
WLAa   = 11.1 mg/L
WLAc   = 4.45 mg/L
Q.L.   = 0.20
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance   = 29.16
C.V.   = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L.   = 0
Model used   = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit   = 8.97863191570258
Average Weekly limit = 8.97863191570259
Average Monthly LImit = 8.97863191570259

The data are:

 9.0 mg/L

VA0060569 - AMMONIA-0.040 MGD

11/1/2011 8:59:11 AM

Facility = Windmill Point Resort & Yacht Harbor WWTP
Chemical = Ammonia - 0.040 MGD Plant
Chronic averaging period = 30
WLAa   = 11.1 mg/L
WLAc   = 4.45 mg/L
Q.L.   = 0.20
samples/mo. = 1
samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance   = 29.16
C.V.   = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L.   = 0
Model used   = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit   = 8.97863191570258
Average Weekly limit = 8.97863191570259
Average Monthly LImit = 8.97863191570259

The data are:

 9.0 mg/L

11/3/2011 2:49:35 PM

Facility = Windmill Point Resort & Yacht Harbor WWTP
Chemical = Ammonia - 0.080 MGD Plant
Chronic averaging period = 30
WLAa = 11.1 mg/L
WLAc = 4.45 mg/L
Q.L. = 0.20
# samples/mo. = 4
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 8.97863191570258
Average Weekly limit = 8.97863191570259
Average Monthly LImit = 6.13892158787266

The data are:

9.0 mg/L

VA0060569 - CPO (TRC)-0.030 MGD

10/28/2011 10:03:32 AM

Facility = Windmill Point Resort & Yacht Harbor WWTP
Chemical = Chlorine Produced Oxidants (for TRC) - 0.030 MGD Plant
Chronic averaging period = 4
WLAa = 26 µg/L
WLAc = 75 µg/L
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20000
Variance = 1440000
C.V. = 0.6
97th percentile daily values = 48668.3
97th percentile 4 day average = 33275.8
97th percentile 30 day average= 24121.0
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 26
Average Weekly limit = 15.8783873755527
Average Monthly LImit = 12.8861502605597

The data are:

20000 µg/L

VA0060569 - CPO (TRC)-0.040 MGD

11/1/2011 9:04:05 AM

Facility = Windmill Point Resort & Yacht Harbor WWTP
Chemical = Chlorine Produced Oxidants (for TRC) - 0.040 MGD Plant
Chronic averaging period = 4
WLAa = 26 µg/L
WLAc = 75 µg/L
Q.L. = 100
# samples/mo. = 30
# samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = 20000
Variance = 1440000
C.V. = 0.6
97th percentile daily values = 48668.3
97th percentile 4 day average = 33275.8
97th percentile 30 day average= 24121.0
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 26
Average Weekly limit = 15.8783873755527
Average Monthly LImit = 12.8861502605597

The data are:

20000 µg/L

VA0060569 - CPO (TRC)-0.080 MGD

11/1/2011 9:09:44 AM

Facility = Windmill Point Resort & Yacht Harbor WWTP
Chemical = Chlorine Produced Oxidants (for TRC) - 0.080 MGD Plan
Chronic averaging period = 4
WLAa   = 26 µg/L
WLAc   = 75 µg/L
Q.L.   = 100
samples/mo. = 90
samples/wk. = 21

Summary of Statistics:

observations = 1
Expected Value = 20000
Variance   = 1440000
C.V.   = 0.6
97th percentile daily values = 48668.3
97th percentile 4 day average = 33275.8
97th percentile 30 day average= 24121.0
< Q.L.   = 0
Model used   = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit   = 26
Average Weekly limit = 13.5384800231324
Average Monthly LImit = 11.9556495015095

The data are:

 20000 µg/L

2006 Permit Reissuance
VA0060569 - Windmill Point
Resort & Yacht Harbor WWTP

11/23/2005 9:52:58 AM

Facility = Windmill Point existing
Chemical = ammonia
Chronic averaging period = 30
WLAa = 2.3 mg/L
WLAc = 2.6 mg/L
Q.L. = 0.2 mg/L
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 2.3
Average Weekly limit = 2.3 mg/L
Average Monthly LImit = 2.3 mg/L

The data are:

9 ug/L

2006 STATS replication for Ammonia to calculate limit to three significant figures

2006 Ammonia Replication

4/3/2012 8:45:03 AM

Facility = Windmill Point Resort and Yacht Harbor
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 2.32
WLAc = 2.6
Q.L. = 0.2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 2.32
Average Weekly limit = 2.32
Average Monthly LImit = 2.32

The data are:

9.0 mg/L

Kazio, Jeremy (DEQ)

From: Brockenbrough, Allan (DEQ)
Sent: Thursday, October 20, 2011 12:12 PM
To: Kazio, Jeremy (DEQ)
Cc: Linderman, Curtis (DEQ)
Subject: RE: Windmill Point WWTP - VA0060569
Attachments: Reissuance of Watershed General Permit

Jeremy-

Sorry for the delayed response. Per our conversation, neither expansion is large enough to trigger the Technology Reg. requirements. I would therefore give them concentrations highlighted below necessary to maintain the permitted design capacity at 0.03 MGD. These limits may be modified if they install more advanced treatment.

Design Flow	TN (mg/l)	TP (mg/l)
0.03	18.7	2.5
0.04	14.0	1.9
0.08	7.0	0.9

With those concentrations in the IP they don't have any increase in load and will not have to submit an offset plan. They do have to register for the reissued GP. Can you forward to them the attached notification?

Thanks,

Allan

From: Kazio, Jeremy (DEQ)
Sent: Monday, October 17, 2011 11:10 AM
To: Brockenbrough, Allan (DEQ)
Subject: Windmill Point WWTP - VA0060569

Allan,

The subject facility is currently authorized to discharge at a design flow of 30,000 gpd. For two permit cycles, they've had expansion tiers in their permit for 40,000 and 80,000 gpd, but they have not submitted a PER for the expanded facility (s). Curt has advised me to insert nutrient concentration limits for the two expansion tiers, but I'm not sure which ones to insert.

Should the nutrient concentration limits be technology-based, or should the limits reflect their current permitted design capacity (i.e. calculate current load, then back calculate for the expansion tiers)?

Thanks for any advice!!

Jeremy S. Kazio
Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road

Attachment H

Ownership Change Documentation and Related Correspondence

Kazio, Jeremy (DEQ)

From: OConnell, Kathleen (DEQ)
Sent: Thursday, February 09, 2012 5:14 PM
To: Kazio, Jeremy (DEQ)
Subject: RE: VPDES Ownership Question - VA0060569 (Windmill Point)

Jeremy – Receivers generally have the authority to do what's needed to run the business, including applying for permits the language below from the Court order confirms that

Receiver") for the Receivership Assets (as hereafter defined) and is hereby ordered and directed to take immediate possession, custody and control of the Receivership Assets (as hereafter defined) until further order of this Court. As used herein, the term "Receivership Assets" shall mean: (a) the Collateral described in the Application **("Collateral")** which consists of certain real property of the Defendant more particularly described in the Deed of Trust attached to the Application, together with all improvements thereon and all leases, rents, profits, fixtures, personal property and other assets relating thereto and including, without limitation and (b) all records required to be kept under applicable safety and environmental laws, licenses, permits,

- undertake variances with respect to the Receivership Assets, subdivide the Receivership Assets, or take other action with respect to zoning, land use and permitting matters, and enter into any agreement, document or arrangement in connection with the foregoing;

In this case the court approved the sale of the property from the Receiver to the new owner listed on the VPDES change of ownership form. I'm pretty sure with that kind of documentation and we're doubly ensured that the Receiver had court ordered authority to submit the permit application documents as the owner and to sign the change of ownership form as the former owner.

Kathleen F. O'Connell
Water Enforcement Program Manager
Department of Environmental Quality
629 East Main Street
Richmond, VA 23219
804-698-4273 (work)
804-698-4277 (fax)
Kathleen.OConnell@deq.virginia.gov

The universe is not required to be in perfect harmony with human ambition. -Carl Sagan

From: Kazio, Jeremy (DEQ)
Sent: Thursday, February 09, 2012 4:42 PM
To: OConnell, Kathleen (DEQ)
Subject: VPDES Ownership Question - VA0060569 (Windmill Point)

Hello Kathleen,

Curt suggested that I seek your advice on a VPDES permitted facility that, in the past year, has undergone foreclosure, has had a Court Appointed Receiver, and was sold at auction on January 26, 2012. The facility's VPDES permit expired on May 2, 2011.

The owner of the facility was formerly Windmill Point Redevelopment Associates, LLC, which was represented by Jeffrey Price out of Monmouth, New Jersey for a number of years. After foreclosure on March 24, 2011, I sought out the Court

Appointed Receiver and asked him to make the appropriate ownership changes to the already-submitted permit application. I received the revised portions of the application back with the SAME owner indicated, Windmill Point Redevelopment Associates, LLC, but with the Receiver as the representative of the LLC. His name is Raymond A. Yancey, and upon searching his name on the internet, I found that he owns a receivership firm out of Florida. During the time that the facility was under Receivership, Mr. Yancey took care of all of the facility's delinquencies, including financial assurance and paying their last 2 years of backed maintenance fees to DEQ.

The facility was sold at auction on January 26, 2012 to RL Prop 2011-1 Investments, LLC. Prior to the sale, I was contacted by Jean Mumm with LeClair Ryan representing the note purchaser, who was also hoping to be the security purchaser via the auction. She wanted to know how to properly transfer ownership of the VPDES permit. I provided her with the Change of Ownership form and told her to have representatives of both the former and new owners sign the document and return it to DEQ. We received the completed Change of Ownership form on February 3, 2012.

I asked Curt if this was adequate to change the owner information on the draft permit (soon to be reissued) from Windmill Point Redevelopment Associates, LLC to RL Prop 2011-1 Investments, LLC. He question whether the Special Receiver (Raymond Yancey) was authorized by law to sign on behalf of the LLC, and suggested contacting you.

I've placed some documents that you might find relevant on the T:drive.

Receivership Court Document (3/30/2011)

VPDES Application Revisions with Special Receiver representing Windmill Point Redevelopment Associates, LLC

Public Sale Notice in Newspaper (1/17/2012)

Transfer of Ownership Paperwork (2/2/2012)

When you get the chance, please let me know if I can change the owner of the permit, or what I need in order to do this properly. Thanks so much!!!!

Jeremy S. Kazio
Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
Tel: (804) 527-5044

LECLAIRRYAN

February 2, 2012

VIA OVERNIGHT MAIL (TELEPHONE: (804)527-5044)

Mr. Jeremy S. Kazio
Water Permit Writer
DEQ Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

Re: Windmill Point Marina
Windmill Point Resort and Yacht Harbor Wastewater Treatment Facility
VPDES Permit Number VA0060569
VPDES Change of Ownership Agreement Form
LeClairRyan File Number: 15658.0011

Dear Mr. Kazio:

This is to advise that RL Prop 2011-1 Investments, LLC, a Delaware limited liability company ("Company") has purchased the Windmill Point Marina in Lancaster County, Virginia, at a foreclosure sale on January 26, 2012.

Enclosed are the following documents:

1. completed VPDES Change of Ownership Agreement Form;
2. Certificate of Registration to transact business in Virginia for the Company issued by the Virginia State Corporation Commission on January 25, 2012; and
3. Order dealing with the receivership action, including authorizing the Receiver to execute documents to effectuate the transfer of assets pursuant to the foreclosure.

Please take the appropriate steps to transfer the above referenced permit to the Company.

E-mail: jmumm@leclairryan.com
Direct Phone: 757.441.8916
Direct Fax: 757.624.3773

999 Waterside Drive, Suite 2100
Norfolk, Virginia 23510
Phone: 757.624.1454 \ Fax: 757.624.3773

If we can be of further assistance to you in accomplishing this, please do not hesitate to contact me.

Sincerely,
LECLAIRRYAN, A Professional Corporation

Jean D. Mumm

/jdm
enclosures

cc: Mr. Peter D. Anzo, Manager of RL Prop 2011-1 Investments, LLC (via electronic mail, w/enclosures)

Ms. Stephanie A. Haugen (via electronic mail, w/enclosures)

Mr. Raymond A. Yancey, Receiver for Windmill Redevelopment Associates, LLC (via electronic mail, w/enclosures)

Ms. Suzanne Taylor, Office of Financial Assurance, Division of Land Protection & Revitalization, Virginia Department of Environmental Quality (via electronic mail, w/enclosures)

VPDES CHANGE OF OWNERSHIP AGREEMENT FORM

VPDES Permit Number: VA VA0060569

Name of Permitted Facility: Windmill Point Resort and Yacht Harbor Wastewater Treatment Facility

Location (City/County): Lancaster

We, the undersigned, hereby request a transfer of ownership for the referenced permit.

Anticipated date of transfer: February 1, 2012

CURRENT OWNER: I (We) hereby agree to the transfer of ownership modification to the referenced VPDES Permit.

Current Owner Name (as listed on the VPDES Permit Cover Page):

Windmill Redevelopment Associates, LLC *

*Signed: _____ Date: January 26, 2012

Printed Name: Raymond A. Yancey Title: President

Address: 1412 Colville Ct.

St. Augustine, Florida 32095

NEW OWNER: I (We) hereby agree to the change of ownership modification to the referenced VPDES Permit, and agree to accept all conditions and responsibilities of the permit.

Transferred permit to be issued to: RL Prop 2011-1 Investments, LLC

*Signed: _____ Date: January 27, 2012

Printed Name: Peter D. Anzo Title: Manager

Address: c/o Vinings Marine Group, LLC

2839 Paces Ferry Road, Suite 450, Atlanta, Georgia 30339

Telephone: (770) 984-9500

*** This form must be signed by properly authorized individuals as specified in the VPDES Permit Regulation**.

* by and through its Court Appointed Receiver, R.A. Yancey & Associates, Inc.

Commonwealth of Virginia

STATE CORPORATION COMMISSION

Richmond, January 25, 2012

This certificate of registration to transact business in Virginia is this day issued for

RL PROP 2011-1 Investments, LLC

a limited liability company organized under the laws of DELAWARE and the said company is authorized to transact business in Virginia, subject to all Virginia laws applicable to the company and its business.

State Corporation Commission
Attest:

Joel H. Peck
Clerk of the Commission

CISMAF

VIRGINIA:

IN THE CIRCUIT COURT FOR THE COUNTY OF LANCASTER

MANUFACTURERS AND TRADERS TRUST COMPANY, *Plaintiff,* v. WINDMILL REDEVELOPMENT ASSOCIATES, LLC, *Defendant.*	:	Civil No.: CL 11-21

ORDER SUBSTITUTING PARTY PLAINTIFF AND DISMISSING PARTY

THIS DAY CAME the movant, RL Prop 2011-1 Investments, LLC, a Delaware limited liability company ("RL"), by counsel, upon its previously-filed motion to be substituted as the proper party plaintiff herein; and

IT APPEARING TO THE COURT, upon the pleadings and the representations of counsel, that:

1. This action was initiated by plaintiff Manufacturers and Traders Trust Company ("M&T"), a secured lender of Windmill Redevelopment Associates, LLC ("Debtor"), to obtain appointment of a receiver for real property, improvements and associated personal property known generally as the "Windmill Point" marina development (collectively, the "Receivership Assets"), as well as associated relief.

2. The Court entered a comprehensive order on March 24, 2011 (the "Receivership Order"), appointing R.A. Yancey & Associates, Inc. (the "Receiver") as receiver,

and has entered a subsequent order permitting the Receiver to undertake certain borrowing (the "Borrowing Authorization Order").

3. Effective as of December 29, 2011, RL succeeded to all of M&T's right, title and interest in the promissory notes, deeds of trust and other instruments collectively comprising the "Loan Documents" as that term is defined in the Complaint and Application for Appointment of Receiver.

4. M&T no longer has any interest in the Loan Documents and the security interests created by and through the Loan Documents.

5. By virtue of RL's acquisition of, and M&T's divestiture of, all right, title and interest in the Loan Documents and security interests that are the subject matter of this action, it is appropriate that RL be substituted for M&T as the party plaintiff herein, that M&T be dismissed from this action, that as of December 29, 2011, M&T be relieved from any funding obligations or other obligations under the Receivership Order and that as of December 29, 2011, M&T Bank and its counsel be relieved from any funding obligations or other obligations under the Management Agreement M&T Bank and its counsel entered into with the Receiver ("Management Agreement").

6. On January 26, 2012, a foreclosure sale of the Receivership Assets was conducted pursuant to the Loan Document and paragraphs 5 and 26 of the Receivership Order at which RL was the successful high bidder.

7. M&T and the Receiver consent to the relief sought by movant, as evidenced by the endorsement of this Order by their respective counsel.

AND IT FURTHER APPEARING TO THE COURT that it is in the interests of justice to do so, it is hereby

ORDERED, ADJUDGED and **DECREED** as follows:

A. RL Prop 2011-1 Investments, LLC, a Delaware limited liability company is hereby **SUBSTITUTED** as party plaintiff herein.

B. Effective as of December 29, 2011, M&T is released, acquitted, exonerated and forever discharged from any funding obligations or other obligations imposed on M&T Bank under the Receivership Order or the Borrowing Authorization Order.

C. Effective as of December 29, 2011, M&T and its counsel are released, acquitted, exonerated and forever discharged from any funding obligations or other obligations under the Management Agreement.

D. M&T is hereby **DISMISSED** from this action.

E. Any and all rights and obligations of M&T arising under the Receivership Order and/or the Borrowing Authorization Order shall be **DEEMED** to be rights and obligations of RL effective as of December 29, 2011.

F. Any and all rights and obligations of M&T or its counsel arising under the Management Agreement shall be **DEEMED** to be rights and obligations of RL effective as of December 29, 2011.

D. The Receiver is **DIRECTED, u**pon the conveyance of the Receivership Assets by the Substitute Trustee to RL by a Substitute Trustee's Deed and Substitute Trustee's Bill of Sale, to: (1) deliver possession and control of all of the Receivership Assets to RL; (2) file with the Court, within forty-five (45) days of the date of the conveyance of the Receivership Assets to RL, a final report and accounting of all rents and revenues collected and fees and expenses paid since the Receiver's last accounting; and (3) provide a copy of said final report and accounting to counsel of record and any party that has not made an appearance herein. The

Receiver is further authorized to, and shall, execute as the Receiver for the Defendants any and all instruments and other documents necessary or appropriate to effectuate the transfer of any of the Receivership Assets to RL pursuant to the foreclosure.

E. The Clerk is **DIRECTED** to provide a certified copy of this order to counsel of record.

ENTER:

Dated: January 31, 2012

Judge

I ASK FOR THIS:

Alan D. Albert
Counsel for RL Prop 2011-1 Investments, LLC, a Delaware limited liability company

SEEN AND AGREED:

Michael G. Gallerizzo
Counsel for Manufacturers and Traders Trust Company

SEEN AND AGREED:

Lizabeth Lee Walther

Lizabeth Lee Walther
Counsel for Receiver

A TRUE COPY
TESTE:
DIANE H. MUMFORD, CLERK
BY _____ D.C.
LANCASTER COUNTY CIRCUIT COURT

http://www.headlineva.com/index.php/public_notices/notice/NOTICE_OF_SUBSTITUTE_TRUSTEES_SALE_WINDMILL_POINT_MARINA_40_Windjammer_Lane/

NOTICE OF SUBSTITUTE TRUSTEES' SALE WINDMILL POINT MARINA 40 Windjammer Lane White Stone, Virgini

NOTICE OF SUBSTITUTE
TRUSTEES' SALE
WINDMILL POINT MARINA
40 Windjammer Lane
White Stone, Virginia 22578
Tax Map Nos.: 41-B-1-A, 41-4-J,
41-4-K, 41-4-L, 41-4-M, 41-4-S,
41-4-T, 41-4, 41-4-A, 41-40, 41-4-P,
41-4-Q & 41-4-R
and
3 TOWNHOMES AND 10 TOWNHOME SITES AT THE LANDING
Tax Map Nos.: 40D-3-16, 40D-3-17, 40D-3-18,
40D-3-19, 40D-3-20, 40D-3-21, 40D-3-23,
40D-3-24, 40D-3-25, 40D-3-26, 40D-3-27,
40D-3-28 & 40D-2-30
Located off State Route 695
in Lancaster County, Virginia

In execution of a certain Deed of Trust dated September 29, 2006, recorded in the Clerk's Office of the Circuit Court of Lancaster County, Virginia ("Clerk's Office") as Instrument Number 060003045 and assigned by that certain Assignment dated December 29, 2011, recorded in the Clerk's Office on January 5, 2012, as Instrument Number 120000033 ("Deed of Trust") from the Grantors named therein ("Borrowers") to David M. Diluigi and Humberto M. Salomon, original trustees ("Original Trustees"), for whom Christopher L. Perkins and Jean D. Mumm ("Substitute Trustees") have been appointed as substitute trustees pursuant to that certain Appointment of Substitute Trustees dated January 3, 2012, and recorded in the Clerk's Office as Instrument Number 120000036 and default having occurred in the payment of the debt secured by the Deed of Trust, and at the request and direction of the holders of the Note ("Lender"), which is the holder of the promissory notes evidencing such debt, the Substitute Trustee will sell the following described property of the Borrowers located in Lancaster County, Virginia at public auction to the highest bidder, for cash on Thursday, January 26, 2012, at 12:00 p.m. (noon) on the front steps of Lancaster County Circuit Court located at 8265 Mary Ball Road, Lancaster, Virginia 22503, to wit:

BEING ALL OF THOSE tracts or parcels of land located in the Bayside District of Lancaster County, Virginia, more particularly described as follows, that is to say:

WINDMILL POINT MARINA:

Tract One:
BEING KNOWN AND DESIGNATED as Lot 2, 2.9257 Acres, Open Space "A", Open Space "B", Open Space "C", Fairwinds Drive and Windjammer Lane, all as shown on the Plat entitled "Subdivision Plat of T.M. 41 Parcel 4N located in the Bayside District of Lancaster County, Virginia" dated June 30, 2010, prepared by Bay Design Group and recorded July 15, 2010, among the Land Records of Lancaster County, Virginia as Instrument Number 100001228, Plat # 0120.
SAVING AND EXCEPTING THEREFROM all of that certain parcel of land located in Bayside Magisterial District, Lancaster County, Virginia, lying between the Rappahannock River and the southern boundary of Lot 9, The Pointe subdivision. Said Parcel is further described with reference to that plat of survey made by William W. Thompsen, L.S., dated July 14, 2008, entitled "Location Survey for Dan T. and Shelia A. Brown", which plat or survey is attached to the Quitclaim Deed dated July 21, 2008, and recorded among the Land Records of Lancaster County, Virginia as Instrument Number 080002031 and described as follows: Bounded on the north by Lot 9, The Pointe; on the east by an extension of Lot 9's eastern property line to the mean low water mark of the Rappahannock River; on the south by

the mean low water mark of the Rappahannock River; and, on the west by an extension of Lot 9's western boundary line to the mean low water mark of the Rappahannock River, which conveyance includes the rip rap and groins depicted on the above referenced survey.

TOGETHER WITH AND SUBJECT TO the rights of others in and to perpetual, nonexclusive easements over the existing streets, roads and driveways of Windmill Point Resort and Yacht Harbor, Inc. for vehicular and pedestrian ingress to and from VSH 695 as set forth in Deed Book 311, Page 586 and 587 of that Deed from Windmill Point Marine Resorts, Inc. to Windmill Point Resort & Yacht Harbor, Inc., said easements having been reserved by Windmill Point Marine Resorts, Inc. for the retained property in said Deed.

Tract Two:
BEING KNOWN AND DESIGNATED as Proposed T.M. 41 Parcel 4A 8.12 +/- acres as shown on the Plat entitled "Boundary Line Adjustment between T.M. 41 Parcel 4A & T.M. 41 Parcel 4N" dated May 3, 2010, prepared by Bay Design Group and recorded May 10, 2010, among the Land Records of Lancaster County, Virginia, as Instrument Number 100000795, Plat # 0104.

TOGETHER WITH AND SUBJECT TO the rights of others in and to perpetual, nonexclusive easements over the existing streets, roads and driveways of Windmill Point Resort and Yacht Harbor, Inc. for vehicular and pedestrian ingress to and from VSH 695 as set forth in Deed Book 311, Page 586 and 587 of that Deed from Windmill Point Marine Resorts, Inc. to Windmill Point Resort & Yacht Harbor, Inc., said easements having been reserved by Windmill Point Marine Resorts, Inc. for the retained property in said Deed.

Tract Three:
BEING KNOWN AND DESIGNATED as Parcel 1, 3.53 +/- acres, Parcel 2, 7.7890 acres, Parcel 4, 0.48 +/- acres, Parcel 5, 13.60 +/- acres, Parcel 6 (Non Residential) 0.8308 acres, Parcel 7 (Non Residential) 1.2774 acres, Tax Map 41 Parcel 4J, 0.9668 acres (Lot 10, The Pointe), Tax Map 41 Parcel 4K, 0.9761 acres (Lot 11, The Pointe), Tax Map 41 Parcel 4L, 0.9353 acres (Lot 12, The Pointe) and Tax Map 41 Parcel 4M, 0.8476 acres (Lot 13, The Pointe), all as shown on the Plat entitled "Subdivision Plat for the land of WINDMILL REDEVELOPMENT ASSOCIATES, LLC" dated January 17, 2008, revised April 28, 2008, prepared by Bay Design Group and recorded October 9, 2008, among the Land Records of Lancaster County, Virginia, as Instrument Number 080002422, Plat Cabinet #7, Pages 192C, 192D & 193A.

TOGETHER WITH AND SUBJECT TO the rights of others in and to perpetual, nonexclusive easements over the existing streets, roads and driveways of Windmill Point Resort and Yacht Harbor, Inc. for vehicular and pedestrian ingress to and from VSH 695 as set forth in Deed Book 311, Page 586 and 587 of that Deed from Windmill Point Marine Resorts, Inc. to Windmill Point Resort & Yacht Harbor, Inc., said easements having been reserved by Windmill Point Marine Resorts, Inc. for the retained property in said Deed.

THE LANDING:

Tract Four:
ALL THOSE CERTAIN LOTS, tracts, pieces of parcels or land, together with all improvements thereon, and all rights, ways, easements, privileges and appurtenances thereunto appertaining, situate, lying and being in Bayside (formerly White Stone) Magisterial District, Lancaster County, Virginia, as shown on that certain plat of survey dated June 23, 2003, made by Bay Design Group, entitled "ALTA/ACSM LAND TITLE SURVEY OF THE LAND NOW OR FORMERLY OF C.W.W.D. DEVELOPMENT COMPANY, L.L.C. FOR CONVEYANCE TO BRIGHTWATER VENTURES-1, L.L.C. LOCATED IN THE BAYSIDE MAGISTERIAL DISTRICT OF LANCASTER COUNTY, VIRGINIA," (the "Plat"), and designated as

Lots 16 through 21, Lots 23 through 28 and Lot 30, The Landing, as shown on Sheet 7 of 7 of the above-named Plat.

The aforementioned plat of survey containing Sheets 1, 2, 3, 4, 5, 6 & 7 is recorded in the Land Records of Lancaster County, Virginia, as Instrument Number 030003162 in Plat Cabinet 7, Slide# 48C, 48D, 49A-D, 50A and incorporated herein by reference. Reference is hereby made to said Plat of survey for a more detailed and accurate description of the parcels herein conveyed.

TOGETHER WITH all of the Grantor's rights and SUBJECT TO the rights of others in and to perpetual, nonexclusive easements over the existing streets, roads and driveways of Windmill Point Resort and Yacht Harbor, Inc. for vehicular and pedestrian ingress to and from VSH 695 as set forth in Deed Book 311 at PAGES 586 and 587 of that

Deed from Windmill Point Marine Resorts, Inc., to Windmill Point Resort & Yacht Harbor, Inc., said reservations having been reserved by the Grantee for the Retained Property in said deed.

Tracts One, Two, Three and Four above are hereinafter collectively referred to as “Real Property.”

AND TOGETHER WITH the interest of the Lender, if any, in the following described personal property at the direction of the Lender as secured party thereof, as permitted by Section 8.9A-604 of the Code of Virginia of 1950, as amended:

All such equipment, fixtures, tangible personal property and intangible personal property, if any, described in the Deed of Trust in which a security interest was granted by Borrowers (“Personal Property”).

The above described Real Property and Personal Property are collectively referred to as the “Property.”

The Property will be sold “AS IS, WHERE IS” and “WITH ALL FAULTS” and subject to the rights of any parties in possession and to such covenants, conditions, easements, restrictions, reservations, encumbrances, deeds of trust, defects, delinquent taxes and assessments, adverse claims and liens, whether filed or inchoate, if any, superior to the lien of the Deed of Trust affecting such Property, duly of record, and constituting constructive notice. The marina property is being sold subject to a Deed of Trust recorded in the Clerk’s Office as Instrument Number 110001500, assigned by that certain Assignment dated December 29, 2011, recorded in the Clerk’s Office as Instrument Number 120000035 securing an original principal amount of up to $96,838.00. The Property will be offered for sale in individual parcels and in such combinations of parcels as the Substitute Trustees shall deem proper, and all of the parcels shall be offered for sale together. The Substitute Trustees shall accept the bid or bids as shall bring the best total price, but reserve the right to postpone the sale or withdraw all or part of the Property from the sale if they deem the highest bid or bids to be inadequate.

TERMS OF SALE: Cash. SETTLEMENT: within fifteen (15) days of sale. Time is of the essence as of the date of settlement. Each bidder may bid on the Property in its entirety or may bid separately on one or more of the parcels and the related Personal Property as offered by the Substitute Trustee. The deposits shall be ten percent (10%) of the successful bid for any townhome or townhome site and $250,000.00 for any bid that includes the marina property. Each successful bidder must deliver to the Substitute Trustee, at the time of sale, a deposit equal to the sum of the deposits required for each of the parcels on which the bidder was the high bid. The deposits shall be made in the form of a certified or cashier’s check drawn on a financial institution acceptable to the Substitute Trustee and Noteholder. No personal checks will be accepted. The deposits, without interest, will be applied to the purchase price at settlement or returned to the unsuccessful bidder(s), as applicable. The entire amount of the successful bid must be paid in full in cash or by wire, cashier’s check or certified check at settlement. Failure to close within fifteen (15) days of sale will result in purchaser’s default. Upon purchaser’s default, the bidder’s deposit shall be forfeited and the Property shall be resold at the risk and costs of the defaulting purchaser. Taxes shall be prorated as of the sale date. The successful bidder shall be required to execute a Memorandum of Sale concerning the purchase of the Property. The Real Property shall be conveyed by Special Warranty Deed and the Personal Property, if any, shall be conveyed, without warranty, by a Secured Party Bill of Sale. Additional terms may be announced at the time of the sale and the Substitute Trustee reserves the right at any time to amend the terms of sale. The Substitute Trustee is not obligated to deliver possession of the Property to the successful bidder; obtaining possession of the Property shall be the responsibility of the successful bidder. If you have any questions or would like additional property information, please contact Ray W. King by phone at (757) 441-8929 or by email: ray.king@leclairryan.com .

Jean D. Mumm,
Substitute Trustee
LeClairRyan,
A Professional Corporation
999 Waterside Drive,
Suite 2100
Norfolk, Virginia 23510
(Jan-12-2t)

FIRST NOTICE OF APPOINTMENT OF SPECIAL RECEIVER
For WINDMILL REDEVELOPMENT ASSOCIATES, LLC

MARCH 30, 2011

Via: US Postal Service, First Class Mail

To: Secured Creditors, Unsecured Creditors, General Creditors, Lessors and Lessees, Trade Vendors, Financial Depositories and Other Parties in Interest

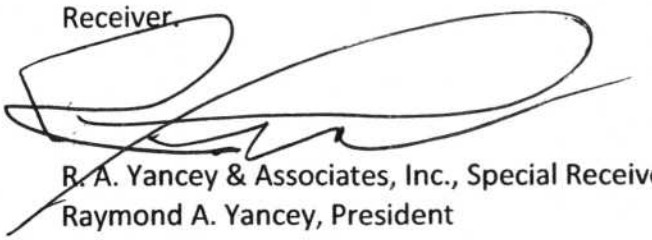
Pursuant to Virginia Code §8.01-595, notice is hereby given that pursuant to Order Appointing Special Receiver and Granting Related Relief (the "Order") entered by the Circuit Court for Lancaster County, Virginia, R. A. Yancey and Associates, Inc. has been duly appointed as the Special Receiver for the assets of Windmill Redevelopment Associates, LLC, including without limitation: (i) a parcel of real property containing approximately 43.5 acres located at 56 Windjammer Lane in White Stone, Virginia generally known as Windmill Point (collectively the "Property"), on which there is a marina intended to include 150 wet boat slips, with associated amenities, including without limitation a 17,000 square foot club building, (ii) additional land approved for 200 beach and marina condominiums,(iii) various subdivided building lots, and (iv) all improvements, leases, fixtures, personal property and other assets located on the Property.

A certified copy of the Order appointing the Special Receiver is attached hereto, and reference thereto is hereby made for a complete description of the assets under the Special Receiver's control.

All creditors, except for M&T Bank, must submit to the Special Receiver not later than April 30, 2011, an itemized statement, signed by its duly authorized officer or representative, of any amounts alleged to be due said creditor from Windmill Redevelopment Associates, LLC and/or its affiliates arising out of or in connection with the Property.

Be advised that no party other than the Special Receiver has the authority to enter into any agreements pertaining to the Property or any of the other Windmill Redevelopment Associates, LLC assets as defined in the Order.

Any questions regarding this Notice or the Order shall be directed to the undersigned Special Receiver.



R. A. Yancey & Associates, Inc., Special Receiver
Raymond A. Yancey, President
1412 Colville Court
St. Augustine, FL 32095
804-690-1807
ray@rayancey.com
http://www.rayancey.com

VIRGINIA:

IN THE CIRCUIT COURT OF LANCASTER COUNTY

MANUFACTURERS AND TRADERS TRUST COMPANY, Plaintiff, v. WINDMILL REDEVELOPMENT ASSOCIATES, LLC, Defendant.	)	Civil Action No.: CL 11-21

ORDER APPOINTING SPECIAL RECEIVER AND GRANTING RELATED RELIEF

UPON CONSIDERATION of the *Complaint for Appointment of Special Receiver* (the "**Complaint**") and the accompanying *Application for Appointment of Special Receiver and Related Relief* (the "**Application**") for filed herein by the Plaintiff, Manufacturers and Traders Trust Company ("**M&T Bank**"), and any responses thereto, and it appearing that service of the Complaint and the Application on the Defendant, Windmill Redevelopment Associates, LLC (the "**Defendant**"), is sufficient and proper, and it appearing based upon the facts and circumstances presented in the Complaint and the Application, and pursuant to the Loan Documents and Va. Code Ann. §§ 8.01-591, *et seq.*, that good and satisfactory cause exists for the immediate appointment of a special receiver to take prompt possession, custody and control of the Collateral (as that term is defined in the Complaint) and the other Receivership Assets (as hereafter defined) in order to protect and preserve the value of the Collateral and the other Receivership Assets, it is this 24 day of March, 2011, by the Circuit Court for Lancaster County, hereby **ORDERED, ADJUDGED AND DECREED** that:

A TRUE COPY
TESTE:
DIANE H. MUMFORD, CLERK
BY _____ D.C.
LANCASTER COUNTY CIRCUIT COURT

1. The relief sought in the Complaint and the accompanying Application is hereby **GRANTED**.

2. R.A. Yancey & Associates, Inc. is hereby appointed as the special receiver (the "**Receiver**") for the Receivership Assets (as hereafter defined) and is hereby ordered and directed to take immediate possession, custody and control of the Receivership Assets (as hereafter defined) until further order of this Court. As used herein, the term "Receivership Assets" shall mean: (a) the Collateral described in the Application ("**Collateral**") which consists of certain real property of the Defendant more particularly described in the Deed of Trust attached to the Application, together with all improvements thereon and all leases, rents, profits, fixtures, personal property and other assets relating thereto and including, without limitation: (i) a parcel of real property containing approximately 43.5 acres located at 56 Windjammer Lane in White Stone, Virginia generally known as Windmill Point (collectively the "**Property**"), on which there is a marina intended to include a total of 150 boat slips, with associated amenities, including, without limitation, a 17,000 square foot club building, (ii) various subdivided building lots, including five (5) inland water access single family lots, (iii) additional land approved for the development of 200 beach and marina condominiums, (iv) all improvements, leases, fixtures, personal property and other assets located on the Property or related thereto; (v) all rents, revenues, profits, proceeds and other sums generated or derived from the Collateral; and (vi) all other related assets described in the Loan Documents (as that term is defined in the Application); and (b) all surety bonds, letters of credit, security deposits, tax deposits, performance deposits, escrow deposits, keys, books, records, bank accounts, checkbooks, ledgers, accounts payable records, accounts receivable records, lease agreements, rent rolls, reports, insurance policies and certificates, executory contracts, plans, specifications, drawings, surveys, subdivision plats, technical manuals, operating procedures, warranties, records required to be kept

under applicable safety and environmental laws, licenses, permits, proffers, entitlements, trademarks, service marks, trade names, intellectual property rights, claims, causes of action, choses in action, and in general all other instruments, documents, rights, properties and assets of any kind or character whatsoever (whether tangible or intangible, whether real, personal or mixed, and whether now existing or hereafter arising) forming a part of or related in any way to the ownership, development, use, operation and management of the Collateral.

3. The Defendant and its directors, officers, employees, agents and representatives are hereby ordered and directed to comply in all respects with the terms and conditions of this Order, and are hereby enjoined and restrained from impeding or interfering in any manner with the exercise or enforcement by the Receiver of its rights, powers and duties hereunder with regard to the Receivership Assets or otherwise.

4. From and after the date of this Order, the Defendant and its directors, officers, employees, agents and representatives shall not enter into any contract, lease, agreement or other arrangement of any kind or character relating to the Receivership Assets , and shall not grant any security interest, lien, claim or other encumbrance in to or against the Receivership Assets.

5. Absent prior approval of this Court, no creditor of the Defendant or other person or entity, shall seek, create or perfect a security interest, lien, claim or other encumbrance in, to or against the Receivership Assets or levy or execute upon the Receivership Assets (as hereafter defined). Notwithstanding the foregoing sentence, the provisions of this decretal paragraph shall not affect M&T Bank's duly perfected, first-priority security interests and liens in, to and against the Collateral or M&T Bank's rights, remedies or recourse under the Loan Documents, applicable law or otherwise with respect to the Defendant or the Collateral.

6. The Defendant and its directors, officers, employees, agents and representatives are hereby ordered and directed to immediately deliver to the Receiver and its authorized agents, representatives, and/or attorneys unrestricted physical possession, custody and control of the Receivership Assets.

7. Within ten (10) days following the entry of this Order, the Defendant and its directors, officers, employees, agents and representatives shall deliver to the Receiver and its authorized agents, representatives, and/or attorneys:

(i) a list of all creditors of the Defendant, including, to the extent known by the Defendant, the names, addresses, telephone numbers and email addresses of each such creditor, and the amount(s) due each such creditor; and

(ii) a list and description of all claims and causes of action that the Defendant holds against all persons and entities in connection with the Receivership Assets, including, to the extent known by the Defendant, the names, addresses, telephone numbers and email addresses of each such person and entity, and the amount(s) due or alleged to be due from each such person and entity.

The Defendant shall supplement the above-described lists promptly to the extent information becomes known to the Defendant regarding additional debts or claims of the Defendant.

8. The Defendant shall cause, and the Receiver shall be authorized on the Defendant's behalf to cause, the Receiver and its authorized agents and representatives to be named as an additional insured on any existing insurance policies covering the Receivership Assets. In addition, the Receiver may, in its discretion, or at the direction of M&T Bank or its agents and representatives, obtain insurance covering the Receivership Assets, and such insurance expenses shall be deemed a normal, ordinary, and necessary operating expenses of the Receivership Assets.

9. The Receiver shall be entitled to the full use and benefit of any surety bonds, letters of credit, cash deposits and similar existing arrangements securing any obligation owing by the Defendant to any third party in connection with the Receivership Assets.

10. All tenants, bailees or other persons or entities in possession of the Receivership Assets or any portion thereof are hereby:

(i) ordered and directed to attorn to the Receiver, and until further order of this Court;

(ii) ordered and directed to tender to the Receiver or its duly authorized agents and representatives, in immediately available funds, all unpaid rents, revenues, profits, proceeds and other sums that are due and payable with respect to the Receivership Assets; and

(iii) enjoined and restrained from paying to the Defendant or its directors, officers, employees, agents or representatives any such rents, revenues proceeds or other sums generated or derived from the Collateral.

11. The Defendant and its directors, officers, employees, agents and representatives are hereby enjoined and restrained from collecting or receiving any rents, revenues, proceeds or other sums payable with respect to the Receivership Assets. Should the Defendant or any of its directors, officers, employees, agents or representatives come into possession of any such rents, revenues, proceeds or other sums payable with respect to the Receivership Assets after the entry of this Order, the Defendant and its directors, officers, employees, agents and representatives are hereby ordered and directed to immediately tender such rents, revenues, proceeds and other sums to the Receiver in immediately available funds.

12. The Receiver is hereby empowered to take all such actions and exercise all such discretion and authority as may be necessary or desirable in connection with the ongoing operation,

maintenance, management, protection and preservation of the Receivership Assets. Without limiting any of the general or specific powers granted herein, the Receiver is hereby vested with all of the powers, rights and duties provided to receivers under the Loan Documents and applicable law. For avoidance of doubt, such powers shall include, without limitation, the power and authority to:

(i) enter upon and take possession, custody and control of any and all of the Receivership Assets;

(ii) take and maintain possession, custody and control of all documents, books, records, papers and accounts relating to the Receivership Assets;

(iii) exclude the Defendant and its directors, officers, employees, agents and representatives from the Receivership Assets;

(iv) manage and operate the Receivership Assets;

(v) borrow monies secured by a first-priority priming lien upon the Receivership Assets for the purposes of maintaining, preserving, or enhancing the value of the Receivership Assets, provided M&T Bank has consented, in writing, to the borrowings and the priming lien;

(vi) maintain, preserve, and protect the Receivership Assets, including making repairs and alterations thereto;

(vii) undertake any construction or repair of the Receivership Assets, with such changes, additions or modifications of the Receivership Assets as M&T Bank may, in its sole and absolute discretion, deem appropriate or desirable;

(viii) conduct a marketing or leasing program with respect to all or any portion of the Receivership Assets, or employ a marketing or leasing agent or agents to do so, under such terms and conditions as M&T Bank may, in its sole and absolute discretion, deem

appropriate or desirable;

(ix) employ such contractors, subcontractors, accountants, architects, engineers, appraisers, attorneys, consultants, property managers, brokers, marketing agents, or other employees, agents independent contractors or other professionals, as M&T Bank may, in its sole and absolute discretion, deem appropriate or desirable to implement and effectuate the rights and powers granted under the Loan Documents;

(x) execute and deliver, in the name of the Defendant or in its own name, such documents and instruments as are necessary or appropriate to consummate any transactions authorized by this Order, the Loan Documents, applicable, or otherwise;

(xi) enter in such contracts, leases and other arrangements, whether for real or personal property, or tenancy agreements, under such terms and conditions as the Receiver, in its discretion, may deem appropriate or desirable, subject to the prior written consent of M&T Bank;

(xii) collect and receive the rents, profits, revenues, and other proceeds from the Receivership Assets;

(xiii) eject tenants or repossess personal property, as provided by law, for breaches of the conditions of their leases or other agreements;

(xiv) sue for any unpaid rents and profits, payments, income or proceeds in the name of the Defendant;

(xv) maintain actions in forcible entry and detainer, ejectment for possession and actions in distress for rent;

(xvi) compromise or give acquittance for rents and profits, payments, income or proceeds that may become due in connection with the Receivership Assets;

(xvii) undertake variances with respect to the Receivership Assets, subdivide the Receivership Assets, or take other action with respect to zoning, land use and permitting matters, and enter into any agreement, document or arrangement in connection with the foregoing;

(xviii) oversee maintenance and management of the Receivership Assets;

(xix) retain such professionals as the Receiver deems necessary and appropriate to market and sell the Receivership Assets and to sell some or all of the Receivership Assets to one or more third party purchasers (including all or any portion of the Collateral), subject to M&T Bank's prior written consent, free and clear of any liens, claims, encumbrances and other interests in such Collateral (with all such liens, claims, encumbrances and other interests in the Collateral attaching to the proceeds of sale at closing) and with all net proceeds arising from any such sale(s), after payment of closing costs, expenses and amounts due the Receiver and approved by M&T Bank, to be immediately paid to M&T Bank to reduce the indebtedness owed to M&T Bank under the Loan Documents (as that term is defined in the Application);

(xx) engage any contractors, subcontractors, accountants, architects, engineers, appraisers, attorneys, consultants, property managers, brokers, marketing agents, or other employees, agents independent contractors or other professionals, as appropriate, in order to advise and assist the Receiver in carrying out its duties under this Order; and

(xxi) take all such further actions and enter into all such other agreements as the Receiver, in its professional discretion, deems appropriate or desirable to maintain, preserve, protect and maximize the value of the Receivership Assets.

13. The Receiver is authorized to employ and compensate such contractors, subcontractors, accountants, architects, engineers, appraisers, attorneys, consultants, property managers, brokers, marketing agents, or other employees, agents independent contractors and other professionals as the Receiver may deem necessary or appropriate to the performance of its duties hereunder.

14. The Receiver shall pay, from the Receivership Assets, all such costs and expenses as shall be incurred by the Receiver in the ordinary course of business in connection with the operation, maintenance, management, protection and preservation of the Receivership Assets, including, without limitation, reasonable expenses required to put the Receivership Assets in a rentable and/or saleable market-ready condition or otherwise necessary to realize the value thereof. Neither the Receiver nor M&T Bank shall be liable for any expenses incurred with regard to the Receivership Assets prior to the Receiver taking possession of the Receivership Assets, nor shall the Receiver or M&T Bank be required to use the Receivership Assets for payment of any expenses incurred with regard to the Receivership Assets prior to the date of this Order. Notwithstanding the foregoing, the Receiver may, in the Receiver's discretion, and upon the prior written consent of M&T Bank, pay those expenses which were incurred in the normal and ordinary course of business of the Receivership Assets prior to the Receiver taking possession of the Receivership Assets if, and only if, the Receiver determines that payment of any such pre-existing expense is necessary and critical to the ongoing operation, maintenance, management, protection and preservation of the Receivership Assets. Otherwise, no pre-existing expenses shall be paid by the Receiver. The Receiver shall not be required to perform under any contract or lease entered into prior to the date on which the Receiver assumes possession of the Receivership Assets.

15. In the event that the rents, revenues and proceeds of the Receivership Assets shall at any time be insufficient to pay the normal, ordinary, and necessary operating expenses of the Receivership Assets, including payment of the Receiver's fees and expenses hereunder, the Receiver is hereby authorized to borrow from M&T Bank from time to time, and M&T Bank is hereby authorized to lend to the Receiver from time to time, such funds as may be necessary to pay such costs and expenses (each such loan, the "**Receivership Loan**"). The amount of any Receivership Loan shall be added to the Loan balance, shall constitute a demand obligation due and owing to M&T Bank, shall bear interest at the Default Rate set forth in the Loan Documents, and shall be fully secured by a duly perfected, first-priority priming lien upon the Receivership Assets in favor of M&T Bank, such lien to be evidenced by the Deed of Trust and the other Loan Documents without further action by M&T Bank. No personal recourse shall be had against the Receiver with respect to any Receivership Loan, and M&T Bank shall look solely to the Receivership Assets to satisfy the balance of any Receivership Loan.

16. The Receiver shall be compensated in this case from the proceeds arising from the operation and/or sale of the Receivership Assets or by M&T Bank, pursuant to a Management Agreement (the "**Management Agreement**") executed by and between M&T Bank and the Receiver, at the Receiver's customary hourly rates (or in the event of a sale, the Receiver's customary commission rate), plus reimbursement of all reasonable and necessary out-of-pocket expenses incurred by the Receiver in the discharge of its rights and obligations hereunder. Such fees and expenses shall be payable to the Receiver monthly (or in the event of sale, upon the sale) from the proceeds arising from the operation and/or sale of the Receivership Assets, or from M&T Bank pursuant to the terms and conditions of the Management Agreement and by way of one or more of the Receivership Loans as described above, without the requirement of a further order of this Court,

provided, however, that the Receiver's fees and expenses shall be disclosed in the monthly accounting described below.

17. On or before the 20th day of each month following the entry of this Order, the Receiver shall prepare an accounting of all rents and revenues collected and fees and expenses paid for the previous month and shall provide a copy of said accounting to M&T Bank's counsel. The Receiver shall file a final report and accounting within forty-five (45) days after the filing of an application for the termination of the receivership established pursuant to this Order.

18. On or before the 20th day of each month following the entry of this Order, the Receiver shall remit to M&T Bank all funds remaining in the Receivers bank accounts for this case, if any, after payment of, or reasonable reserve for, the just and reasonable fees and expenses of the Receiver (including, without limitation, the costs of operation, maintenance, management, protection and preservation of the Receivership Assets, and professional fees and expenses of the Receiver), which funds shall be applied by M&T Bank to reduce the indebtedness owed by the Defendant to M&T Bank under the Loan Documents (as that term is defined in the Application).

19. The Receiver shall take reasonable action to ensure that it complies with all laws applicable to the possession, use, occupancy, management, operation and maintenance of the Receivership Assets as provided under any laws of the United States, the Commonwealth of Virginia, and otherwise.

20. Without limiting any other rights or immunities the Receiver may have at law or in equity, the Receiver and its past, present and future professionals, agents, representatives, employees, affiliates, successors and assigns shall have no liability for acts or omissions in connection with this Order, the receivership established pursuant to this Order, the Defendant or the Receivership Assets, so long as such acts and omissions are made in good faith and without gross

negligence. The foregoing exculpation shall survive the termination or resignation of the Receiver, and the termination or suspension of the receivership established hereunder. The Receivers shall be entitled to obtain such insurance coverage as it may deem reasonable to protect itself and its professionals, agents, representatives, employees, affiliates, successors and assigns against any claims and/or liability which are covered, or not covered, by the foregoing exculpation, and any premiums or fees for such insurance shall be paid from the Receivership Assets and constitute a fee or expense of the receivership.

21. All fees and expenses of the Receiver shall constitute a first lien and charge against the Receivership Assets, with senior priority ahead of all other security interests and liens, including, without limitation, the security interests and liens of M&T Bank.

22. The Receiver shall post a bond in the amount of $50,000.00 within five (5) business days following the entry of this Order.

23. The Receiver and/or M&T Bank shall be entitled to cause a copy of this Order to be recorded in the Office of the Clerk of the Circuit Court for Lancaster County, Virginia, and in all such other filing offices within or without the Commonwealth of Virginia as the Receiver and/or M&T Bank may deem necessary or appropriate.

24. Any action that is due under this Order on a day that is a weekend or a legal holiday shall not be due until the next business day.

25. This Court shall retain jurisdiction and supervision of all matters concerning the Receiver, the receivership created hereby and the Receivership Assets. Any and all actions which affect the Receiver or the Receivership Assets shall be brought in this Court. The Receiver may seek instructions and additional authority and/or direction from this Court upon written notice to M&T Bank and the Defendant.

26. Nothing contained in this Order shall limit or prevent M&T Bank from exercising or enforcing any of its rights, remedies, or recourse under the Loan Documents, applicable law or otherwise with respect to the Defendant, any guarantors of the Loan, or the Collateral.

Enter

DATE: March 24, 2011

SO ORDERED:

Judge
Circuit Court for Lancaster County

I Ask For This:

VA Bar No. 33993

Attachment I

2009 Bacteria Study Email

From: Bishop,Patrick
Sent: Tuesday, May 12, 2009 2:32 PM
To: Mosca,Denise
Subject: RE: VPDES VA0060569, Windmill Point
I think that they're about to get a stick in their eye in r.e. their annual FA update.

Patrick L. Bishop
Virginia Department of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060
Direct - (804) 527-5127
Fax - (804) 527-5106
plbishop@deq.virginia.gov

Always remember that you're unique. Just like everyone else. - Zen proverb

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From: Mosca,Denise
Sent: Tuesday, May 12, 2009 2:31 PM
To: Bishop,Patrick
Subject: RE: VPDES VA0060569, Windmill Point

Yes, they'll get the limit next year because they didn't submit the information in time. Cody jumped on the study, but did E. coli instead of enterococci. By the time he did it again, WP didn't have much flow because they weren't operating, so getting the 12 samples took forever.
Denise

Denise Mosca
Environmental Specialist II
DEQ-Piedmont Regional Office
4949-A Cox Road,
Glen Allen, Va. 23060
(804) 527-5027
fax (804) 527-5106

From: Bishop,Patrick
Sent: Tuesday, May 12, 2009 2:28 PM
To: Mosca,Denise
Subject: RE: VPDES VA0060569, Windmill Point

I'm not really willing to bend the rules any more than we have. I think the only other sticking point will be next year when their schedules are done will they be getting an Entero limit or not, and that decision ain't up to me.

Patrick L. Bishop
Virginia Department of Environmental Quality
Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060